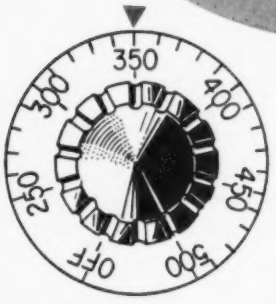
The Electrical Industry's Weekly Magazine April 18, 1960

Electrical World

Price 50 Cents

A McGraw-Hill Publication

commercial cooking...



Now a Full-Fledged Member of the Commercial Load Family

SPECIAL REPORT STARTS ON P 75

Philip Sporn Reviews Progress Of Soviet 7-Year Power Program . . . p 71

UMIV MICROFILMS INC
EDITORIAL DEPT
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ANN ARBOR MICH

Recent developments in mobile transformers help utilities . . .

REDUCE INVESTMENT IN RESERVE CAPACITY

TO SERVE GROWING LOADS and to reduce transmission system investment, electric utilities are steadily increasing the size of transmission stations and the ratings of station transformers. In addition, many utilities are finding the *mobile transformer* an important tool to further reduce system investment.

MOBILE TRANSFORMER CAPACITIES, however, have had to expand with expanding systems. And they have.

Ten years ago, the highest-capacity mobile transformer built was rated about 6000 kva. Today, General Electric has built and sold mobile units rated as high as 40,000 kva.

Electric utilities have been quick to recognize the savings in system reserve capacity which larger capacity mobile transformers make possible. The proof? 34 percent of all mobile units (substations and transformers) in service today have been purchased in the past 3 years. And 40 percent of current General Electric sales in mobile units are mobile transformers, which have emerged as separate products with distinct applications.

Mobile transformers are being used primarily for reserve capacity, today, while the mobile substation has found its place as a maintenance tool.

SAVINGS that may be obtained through use of mobile transformers are often highly dramatic. Some utilities have found that mobile units pay for themselves in one year. The reasons are clear:

- One mobile transformer can serve as emergency capacity for a number of stations distributed over a wide area.
- With mobiles, existing installed capacity can be used more efficiently. Much higher loading of all station facilities is possible.
- Larger capacities available today extend use (and economies) of mobiles to a larger percentage of transformers used over an entire system.

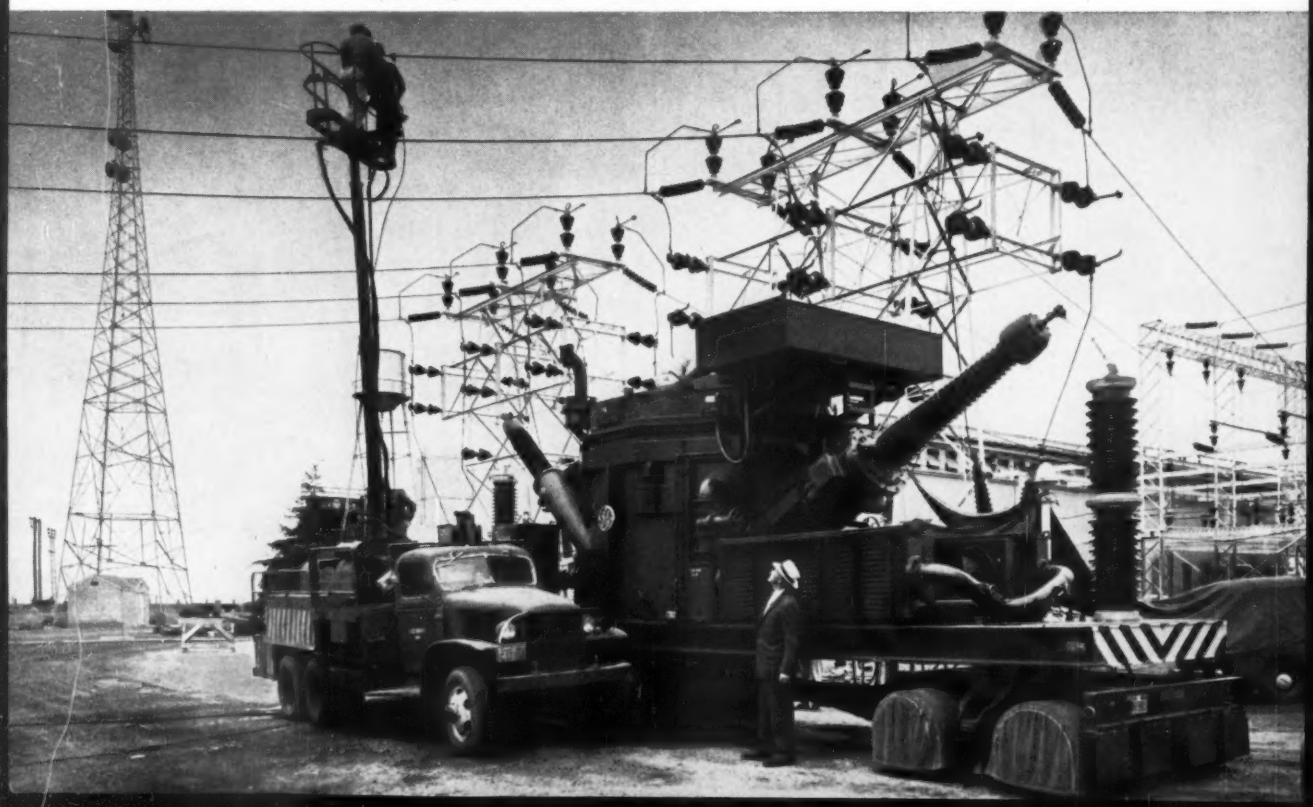
OTHER IMPORTANT BENEFITS causing electric utilities to look with increasing favor on mobile transformers include the *speed* with which they may be put into service in case of emergency and the *improved service continuity* they make possible, with consequent returns in customer good-will.

NEW CONCEPTS in design, in materials, and in manufacturing have made possible great increases in the kva capacity of mobile transformers in just the past few years. Important as these developments are, they represent only a fraction of the total effort devoted by General Electric to its most important mission: to work with electric utilities to get more power on the line and to keep the cost of power low. General Electric Co., Schenectady 5, N. Y.

604-02

GENERAL ELECTRIC

PACIFIC GAS AND ELECTRIC linemen tap in on high-voltage bus in initial test of G-E 40,000-kva, 230-kv mobile transformer.



Electrical World

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Vol. 153, No. 16 APRIL 18, 1960

In This Week's Issue

CURRENT EVENTS

B-L-H Wins Glen Canyon Dispute

General Accounting Office upholds Baldwin-Lima-Hamilton in Glen Canyon Turbine bid.....p 66

Ontario Hydro Plans 460-Kv Line

About 500 miles of EHV transmission line is planned to deliver power from Abitibi Canyon to southern markets.....p 68

MANAGEMENT

USSR 7-Year Power Plan Pressed

Philip Sporn, American Electric Power Co

On time but faces tougher problems; larger steam units come slowly; Khrushchev sets goals up to 1980.....p 71

Special Report

5th Commercial Cooking Survey

Latest Hotpoint Survey discovers that 455,971 kw in new cooking load was added in 1959 by 72 commercial-cooking-conscious utilities. Earnings jumped to $10,829,698 by end of 1959. Commercial cooking up 116% in five years, compared with 39% for total commercial load.....p 75

Departments

Books 138
Editorial Comment..... 63
Electric Utility Methods 87
Electrical Week 19
Engineering Reference Sheet 118
Letters 5
Management Newsletter ...121
Manufacturers News 96
New Equipment.....104
News About People.....132
Nuclear Notes 22
Politics and Public Power... 20
Procurement & Products.... 93
Selling 127
INDEX TO ADVERTISERS...142

SERIES PM-20

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HANDLES THE BIG JOBS FASTER...WITH FEWER MEN

The PM-20 combines the best features of preceding models with latest engineering advancements . . . for greater strength and versatility than ever. On the job, this means savings as high as 40% in time and manpower—every job is completed faster with fewer men.

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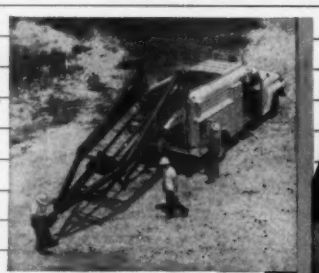
There's a PM-20 for handling 40', 55' and 70' poles. When equipped with optional head sheave extension, respective reach is increased to 25½', 29½' and 34' for handling 50' 65' and 80' poles.

Unit shown below is equipped with a Series EM-2 "Earth-Master" Guided-Auger Hydraulic Digger which digs straight, clean holes . . . vertically and at various angles . . . up to 30" in diameter and 10' 6" in depth in any type soil.

Send for descriptive literature and prices.

OPTIONAL HYDRAULIC HEAD SHEAVE EXTENSION INCREASES REACH 5 FT.—HANDLES LONGER POLES AND SPEEDS HANGING OF TRANSFORMERS



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ELECTRICAL WORLD
Vol. 153, No. 16, April 18, 1960

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. **Executive, Editorial, Circulation and Advertising Offices:** McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Printed at 90-129 North Broadway, Albany 1, N. Y. See panel below for information regarding subscriptions or change of address.

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United States and Canada subscription rate for individuals in the field of the publication $6.00 per year; single copies 50 cents. Other Western Hemisphere and the Philippines $20.00 payable in advance and other countries $30.00 payable in advance.

Second-class postage paid at Albany, N. Y. Title registered in U. S. Patent Office.

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SUBSCRIPTION AND ADDRESS CHANGES: Send subscription correspondence and change of address to Fulfillment Manager, ELECTRICAL WORLD, 330 West 42nd Street, New York 36, N. Y. Subscribers should notify Fulfillment Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

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LETTERS

Others Are Interested

To the Editor:

I would like to take this opportunity to express my appreciation for the splendid presentation that "Electrical World" did on the mobile transformer unit (EW, Feb. 15, p 126). The pictures were especially good and did more for making the article a success than any other single factor.

I have already received several requests for complete details on this unit. This means that Electrical World is doing a great deal for the power industry in securing information that can be of possible help to others.

John D. Harris
Gulf Power Co
DeFuniak Springs, Fla.

Analyst Comments on Capital Structure

To the Editor:

I read with interest the Management Newsletter on capital structure in the March 28 issue of Electrical World.

I agree that what the management should seek is the structure which will give the common stock the greatest value. Market price is not the measure of value. At present it is probably, as you say, price/earnings ratio. In other markets, it has been yield.

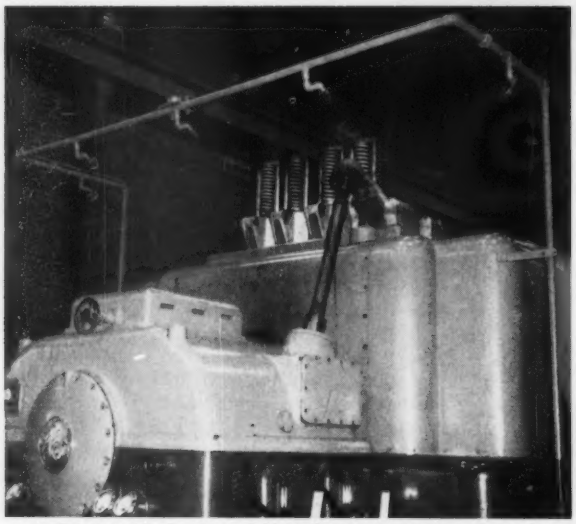
I disagree with your statement that capital structures take years to alter. Debt ratio can be reduced by calling bonds and selling stock and I know one company president who has told me that under the proper conditions, he would buy his company's common stock in the market. The SEC altered many capitalizations radically without reorganization.

As to your statement that debenture money is cheap because of tax savings, this is only so if the company is earning less than its allowed return. Otherwise, the saving increases the return further above the fair value and will eventually be taken away by a rate cut.

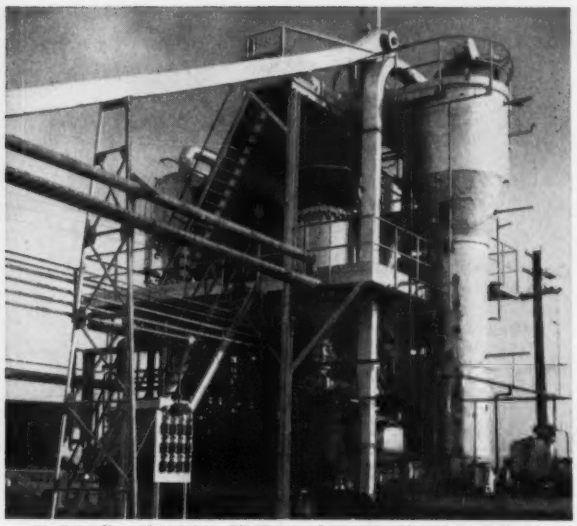
Your assumption of raising 60% of new money in bonds, although allowed by the bond indenture, would probably hurt the bond rating and therefore would be avoided.

As to influences determining the price/earnings ratio, I am not surprised at the 56 influences found by Jacoby and Weston. By now, some of these are probably out of date and others have come up. Basically, of course, price is determined by supply and demand. I remember three large issues of Pacific Gas & Electric bonds, which followed each other at three month intervals. The supply was so greatly increased by these successive issues that the yield had to be lifted about 20 basis points higher for each issue above that of the preceeding one. Obviously no one management can affect supply; it can only try to avoid financing in periods when the market is flooded. Its real hunt must be to try to stimulate demand. As you say, it will strive to

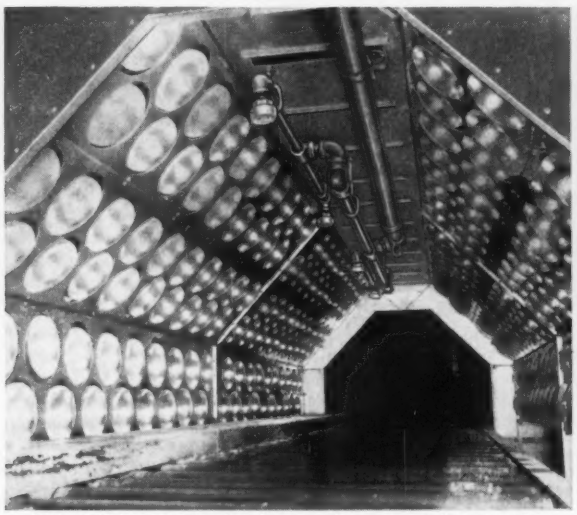
(*Continued on page* 140)



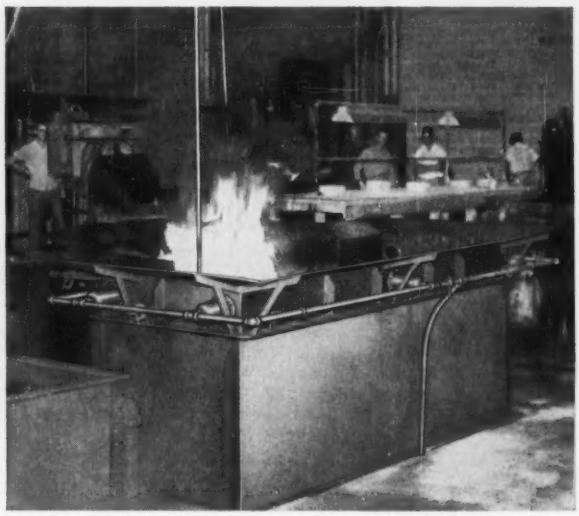
At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell Protecto-Spray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.



At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system engineered by Grinnell to protect against possible fire resulting from ignition of flammable vapor mixtures.



At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

You can rely on Grinnell for the right protection against destruction by fire!

Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film — "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write — Grinnell Company, Providence 1, Rhode Island.

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You can save money on crew time with Graybar as your auxiliary warehouse

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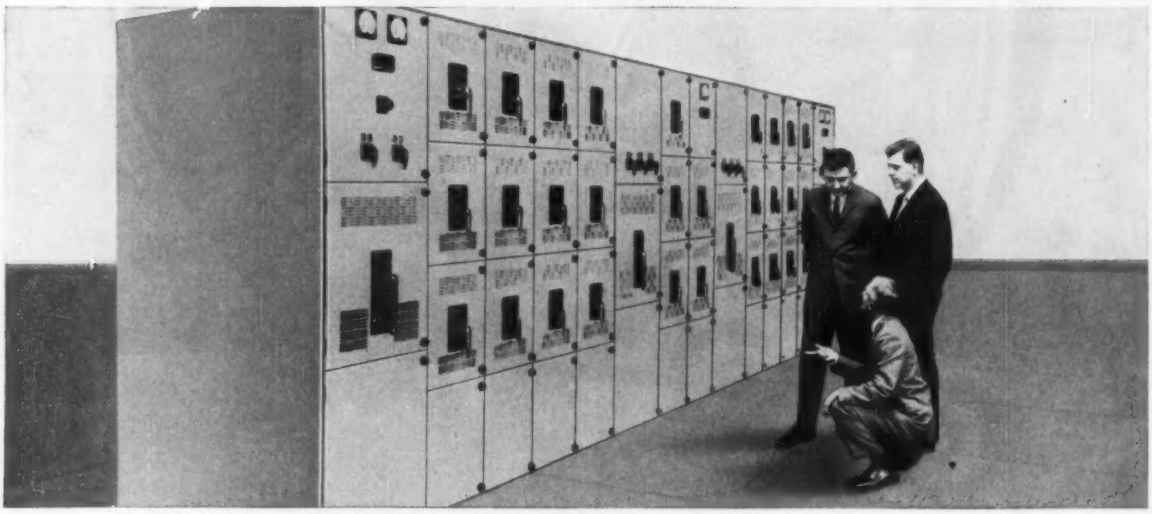
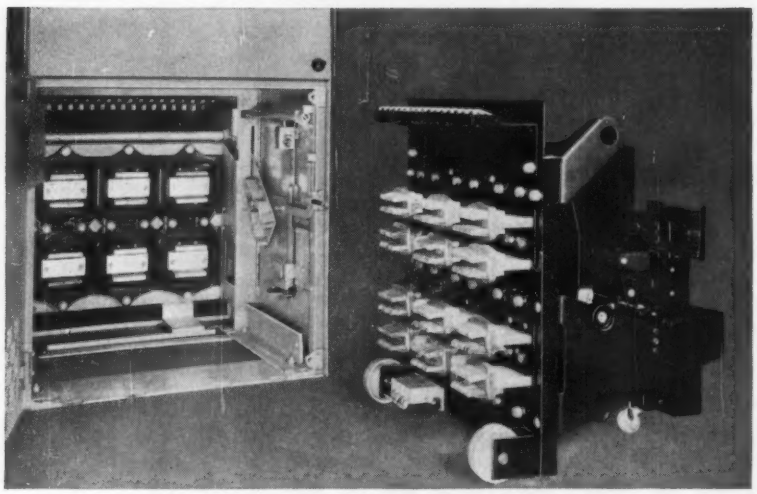
Westinghouse low-voltage, metal-enclosed switchgear is modern inside and out . . . loaded with features to assure you of a high return on your investment.

Absolute mechanical and electrical integrity is guaranteed with 100% use of Westinghouse components. Design performance is thoroughly proved in exhaustive tests at the Westinghouse High Power Laboratory.

Minimum cost is possible by specifying "Standardized" over-all design. Westinghouse "Standardized" switchgear meets all normal requirements within its rated interrupting capacity . . . eliminates additional engineering and manufacturing costs of expensive "specials."

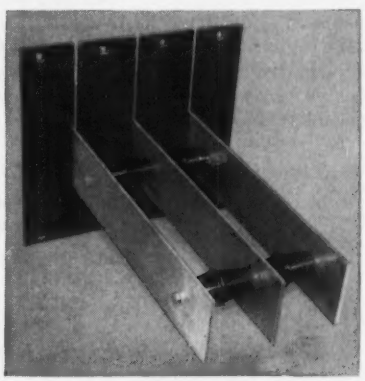
Nationwide switchgear manufacturing plants are ready to serve you . . . convenient for consultation and inspection during equipment construction. All units are thoroughly tested for conformity to NEMA standards. Where conditions permit,





Cluster-Type Disconnect Fingers permit quick inspection when breaker is withdrawn from cell. A spring-mounted floating retainer maintains full contact pressure and assures maximum current rating capacity despite minor variations in breaker alignment.

Glass Polyester Bus Supports and Short Circuit Bracing . . . provide ideal physical and electrical properties for low-voltage, metal-enclosed switchgear. The insulation is highly track resistant and flame retardant. Design of supports and bracing affords increased vertical creepage distances. Result: maximum safety with minimum maintenance.



Long-Term Operating Economy

switchgear is shipped as one completely assembled apparatus.

And, mighty important . . . *Westinghouse assumes complete, undivided responsibility for the switchgear* from planning to the satisfactory overall operation of the installed equipment. For detailed information on low-voltage, metal-enclosed switchgear, call your Westinghouse sales engineer, or write: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

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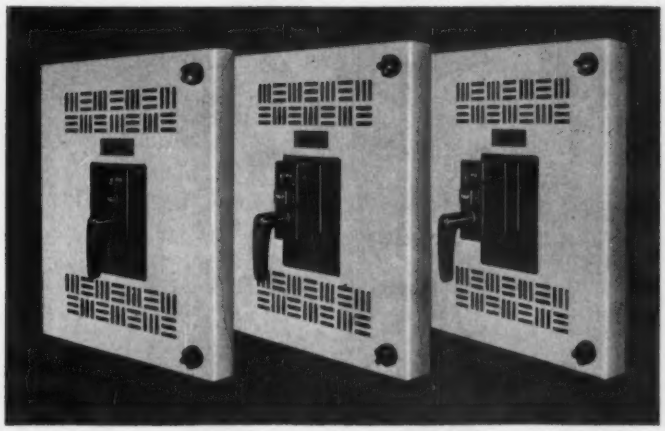
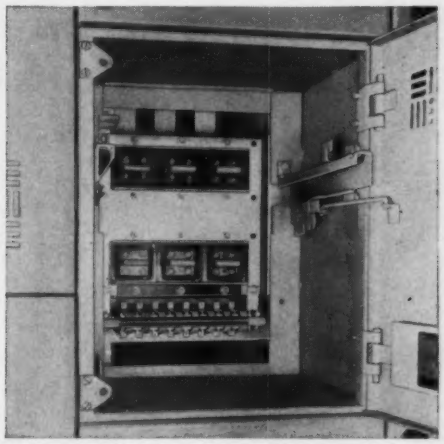
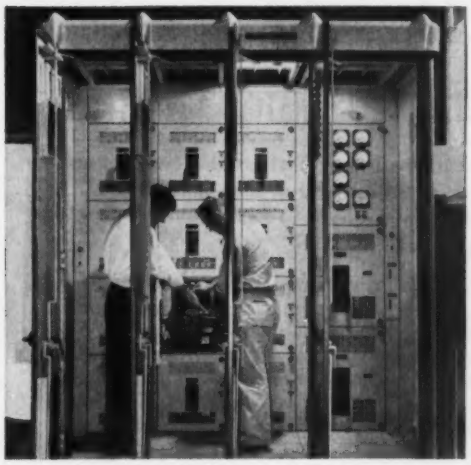


Three-Position Drawout Design permits the De-ion® type DB breakers to be in "connected"—"test"—or "disconnected" position with the breaker door closed. The breaker can be tested in complete safety and storage space for the breaker is also provided when in fully disconnected position.

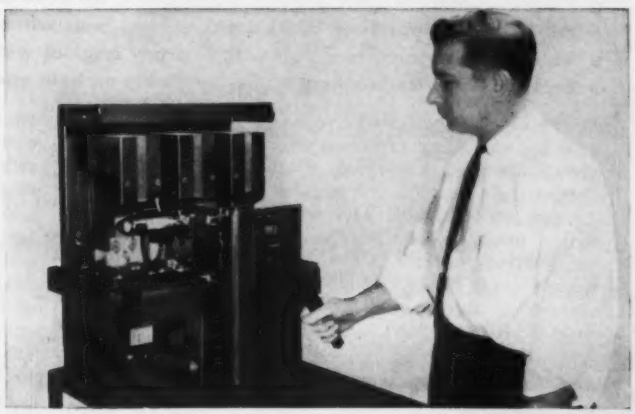
Individual Breaker Compartments include interlocks and positioning devices to assure safe removal or replacement of breakers. Dead-front design provides maximum protection and safety for operators and equipment.

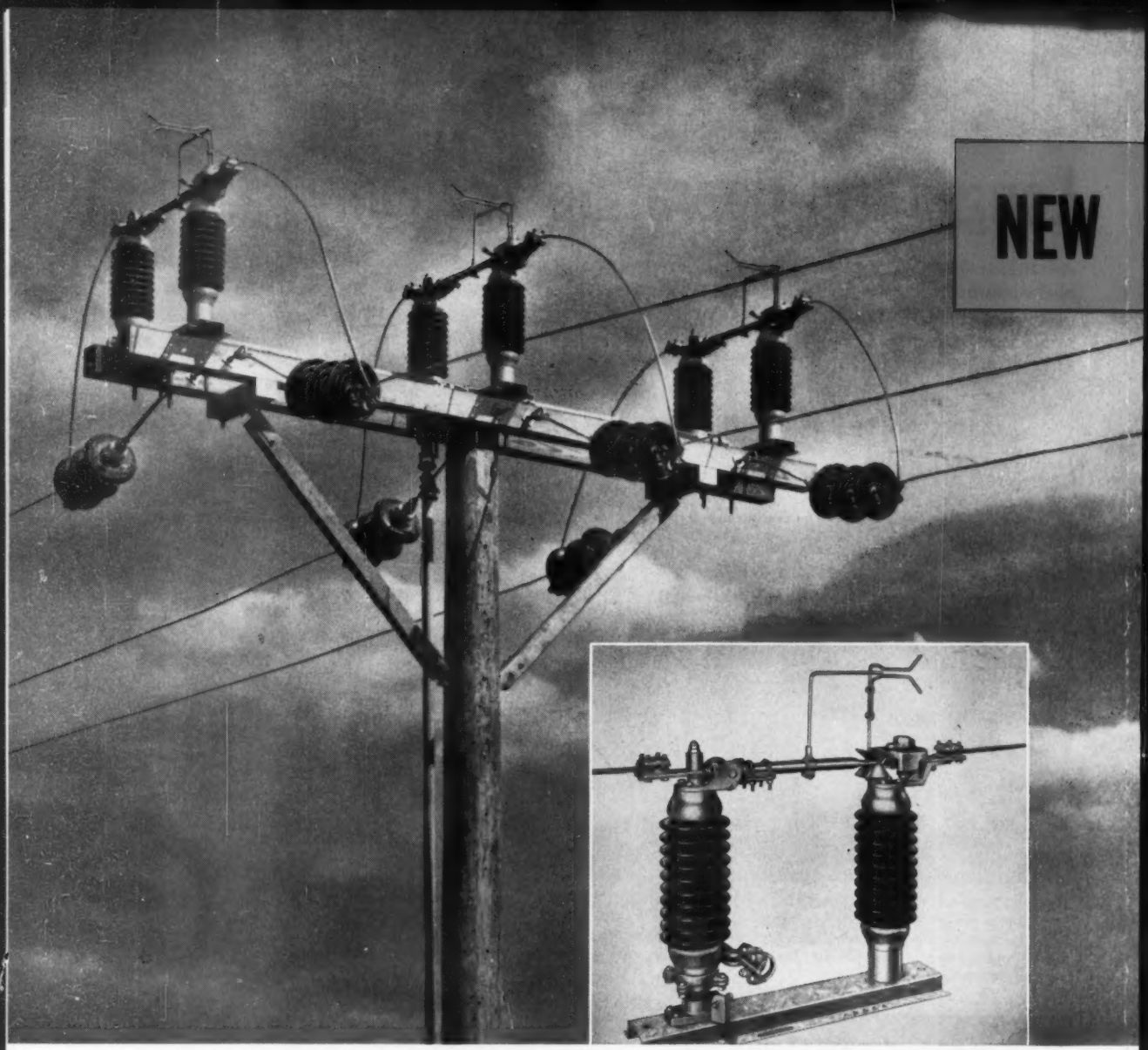




"Walk-In" Aisle provides protected work space in outdoor units. Addition of this space to the weatherproof, functional design permits easy inspection and maintenance without exposure of equipment or personnel under all weather conditions.

Three Breaker Closing Mechanisms are available to match your requirements—dependent manual, independent manual, or electric—for DB-15, DB-25 and DB-50 breakers. NEMA standards specify electric mechanism for closing DB-75 and DB-100 breakers. The independent manual mechanism, shown below, assures uniform breaker operation—regardless of operator's motion—prevents delayed closing and excessive contact burning.





NO OTHER SIDE-BREAK DISCONNECT GIVES YOU ALL OF THESE OPERATING ADVANTAGES

- **Correct contact always maintained at blade tip even if crossarm warpage distorts the switch base.**
- **All blades engage fully in the break-contact jaws without precise adjustment of the inter-phase rods.**
- **Less time and labor to install with Kearney original wide-tolerance mechanical design.**
- **Easiest, surest ice-breaking ability available on both opening and closing.**

This newest Kearney development solves long-existing operating problems of crossarm mounted group operated side-break disconnects. The best supporting structure or crossarm construction may . . . due to ice loads, age, wind or line strain . . . deflect enough to distort the switch bases, or alter the relative positions of the three phases. This often causes loss of contact or failure of all blades to close completely in conventional disconnects with both rigid blades and stationary break-contacts.

Kearney's advanced design features a self-aligning blade constructed to permit controlled vertical movement and axial rotation. This automatically compensates for base distortion . . . keeps the blade tip correctly aligned in the contacts. The break-contact swings 30-degrees with the blade as it is opened or closed, producing high leverage ice-breaking ability and full wiping of the silver current transfer surfaces. On closing, the blade tip fully engages the break-contact before the contact moves from its angular open position, compensating for any shift in position of the switch bases. This same feature also allows considerable freedom in interphase rod adjustment, enabling Kearney *Self-Aligning* side-break switches to be installed faster and more economically than other types.

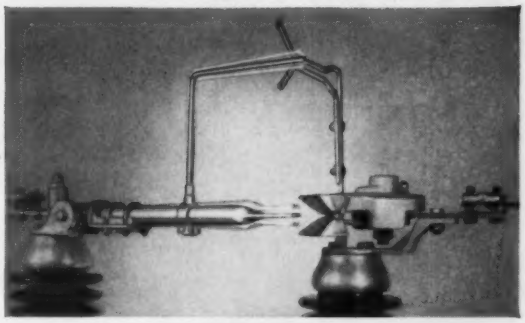
The details of these original features for maintenance-and-adjustment-free operation are shown on the facing page.

Kearney's

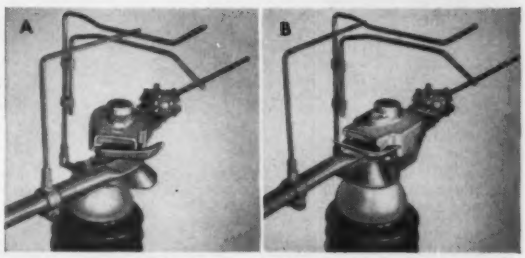
Self-Aligning SIDE-BREAK DISCONNECTS

...always make positive contact, even if the supporting structure warps, twists, bows or settles.

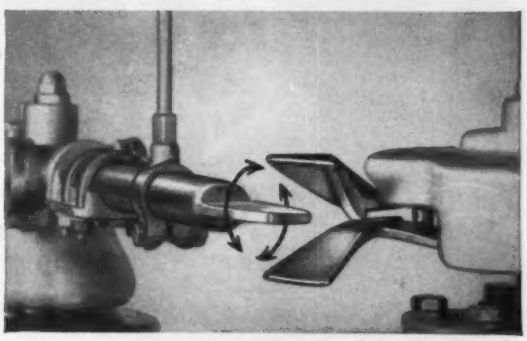
Self-aligning blade moves in a vertical plane to re-establish the original relationship between blade tip and contacts if supporting structure warpage distorts switch base. Wide mouth contact jaws assure blade entry into the contacts. Vertical 1¼" movement more than corrects for extreme cases of misalignment.



Break-contact swings 30° in the plane of blade travel as switch is opened or closed, providing highest leverage ice-breaking and full wiping of the current transfer surfaces. Note that the blade tip is fully engaged, and full contact is maintained (A) through the final 20° of blade travel to the fully closed position shown at (B). This feature allows more latitude in phase rod adjustment than other designs.



Blade rotates 12° on its longitudinal axis. If base distortion has affected blade-contact alignment, the blade tip will rotate as it enters the break-contact to keep all contact surfaces parallel, automatically restoring contact alignment. Friction reducing construction at all rotation points minimizes operating effort.



Switch carries full-rated load current well within NEMA temperature rise, from a fully closed position to 20° partially open position. Ratings available, 7.5 through 69 kv, 600 amperes. Equipped with conventional or whip-type arcing horns... torsional or spade-type operating mechanism. May be mounted horizontally, vertically, or underhung.

For full details talk to your Kearney representative, or write direct for Bulletin 8B.

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A shrieking horn announces the bad news

--POWER UPSET!

In the next few minutes, this man will be too busy putting his station back in service to think about anything else.

While he's restoring service, MOR (F&P Millisecond Operations Recorder) will be busy recording every change in the trouble contact positions on a permanent logsheet. MOR will record the exact sequence and time of events . . . even when they're only milliseconds apart . . . and will do it all automatically.

MOR is designed to monitor from 100 to 400 points and can be connected in parallel with existing annunciator systems.

The low cost of this automatic recorder permits its use in small stations of 75 kw or more . . . as well as in the largest generating stations. The cost is less than that of reconstructing the cause of one major power upset.

Get all the facts on this low-cost recorder by requesting Catalog 30A1400 from your nearest F&P Sales Engineer. Better yet, ask for a MOR demonstration at your own plant.

Fischer & Porter Company,
5540 County Line Road,
Warminster, Pennsylvania.

FP

These MANUFACTURING AFFILIATES carry Fischer & Porter engineering designs to the far corners of the earth: FISCHER & PORTER (CANADA) LTD., DOWNSVIEW, ONTARIO. • FISCHER & PORTER LTD., WORKINGTON, CUMBERLAND, ENGLAND • FISCHER & PORTER G.m.b.H., GROSSELLERSHAUSEN, BEI GOTTINGEN, GERMANY • FISCHER & PORTER N.V., KOMEETWEG 11, THE HAGUE, NETHERLANDS • FISCHER & PORTER Pty. LTD., 184 HANNA ST., SOUTH MELBOURNE, VICTORIA, AUSTRALIA.

ALLIS-CHALMERS

"Originators of 5/8% Step Regulators"

Caliband is an Allis-Chalmers trademark.

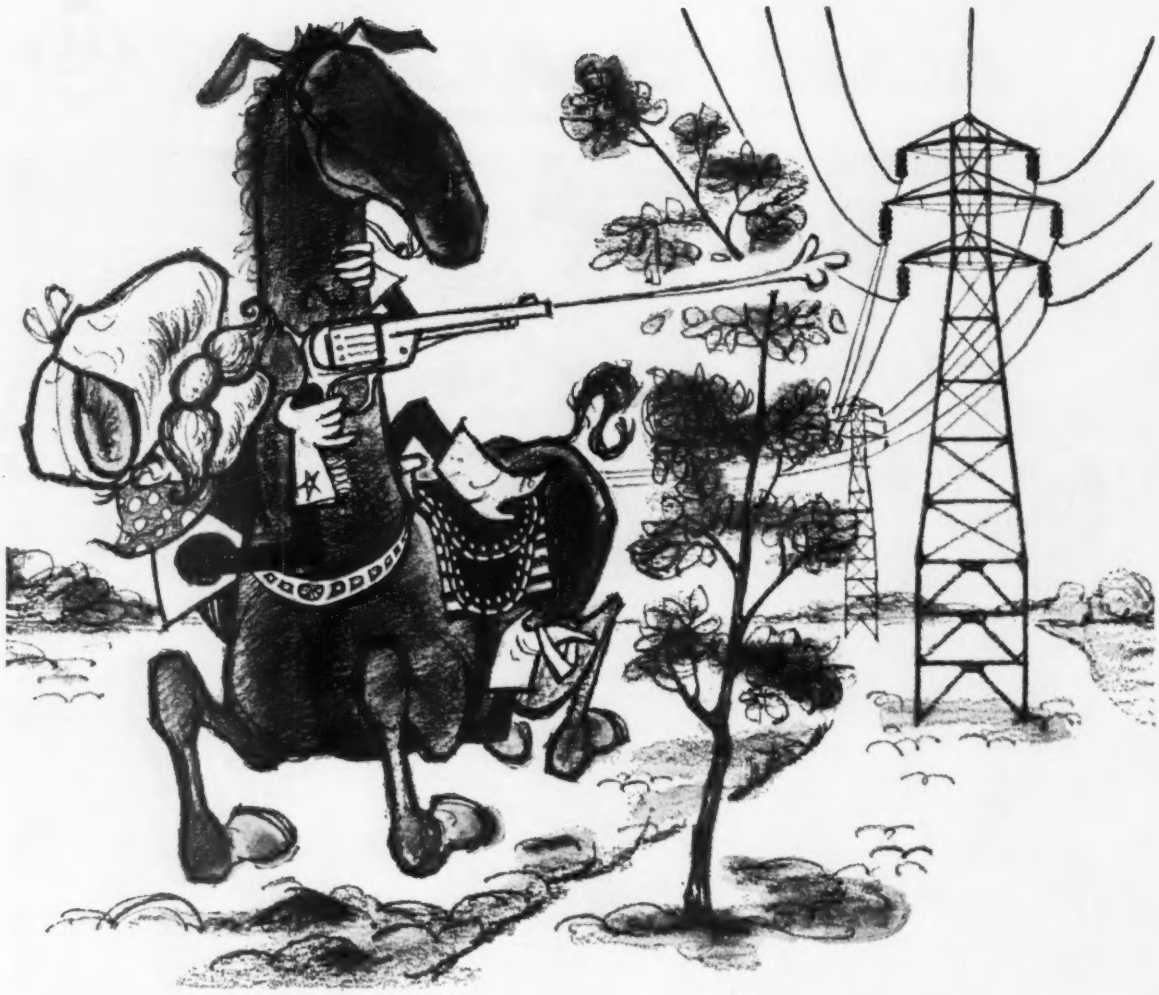
Lower! Lighter! Perfect for joint-pole use

new JFR regulators cut installation costs

CALIBAND control slashes setting time without changing customer voltage or interrupting service! A twist of the knob and you set or test voltage level and band width. No need to return compensator settings to zero.

Allis-Chalmers all-new JFR is the top qualifier for joint-pole use . . . pad or platform mounting. Tank size and weight reduced up to 33%, due to JFR's improved materials and design techniques. Naturally, you save on transportation, handling and installation.

More new JFR advantages! Now offered as *standard*, position indicator drag hands reset by pushbutton on the control panel. A new, quick-sight gauge instantly reveals oil level. Exclusive unidirectional breather removes all moisture and contaminating gases. And a new cover, with hidden bushing mounting studs, cuts maintenance. *For all the facts ask your nearby A-C office for new JFR Bulletin 21B7977E or write* **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1261



Meet the LINE RIDER from the Diamond Spread

THE LINE RIDER AND HIS GANG of Diamond Chemical killers are deadly (for weeds and brush, that is). They're inexpensive killers, too . . . and can save your department thousands of dollars a season.

FOR MIXED BRUSH—LINE RIDER LV-3D/3T, a 2-Ethyl Hexyl Ester formulation of 2,4-D and 2,4,5-T containing 3 pounds each of acid equivalent per gallon.

FOR MAPLES AND OAKS—LINE RIDER LV-6T, a 2-Ethyl Hexyl Ester formulation of 2,4,5-T containing 6 pounds of acid equivalent per gallon.

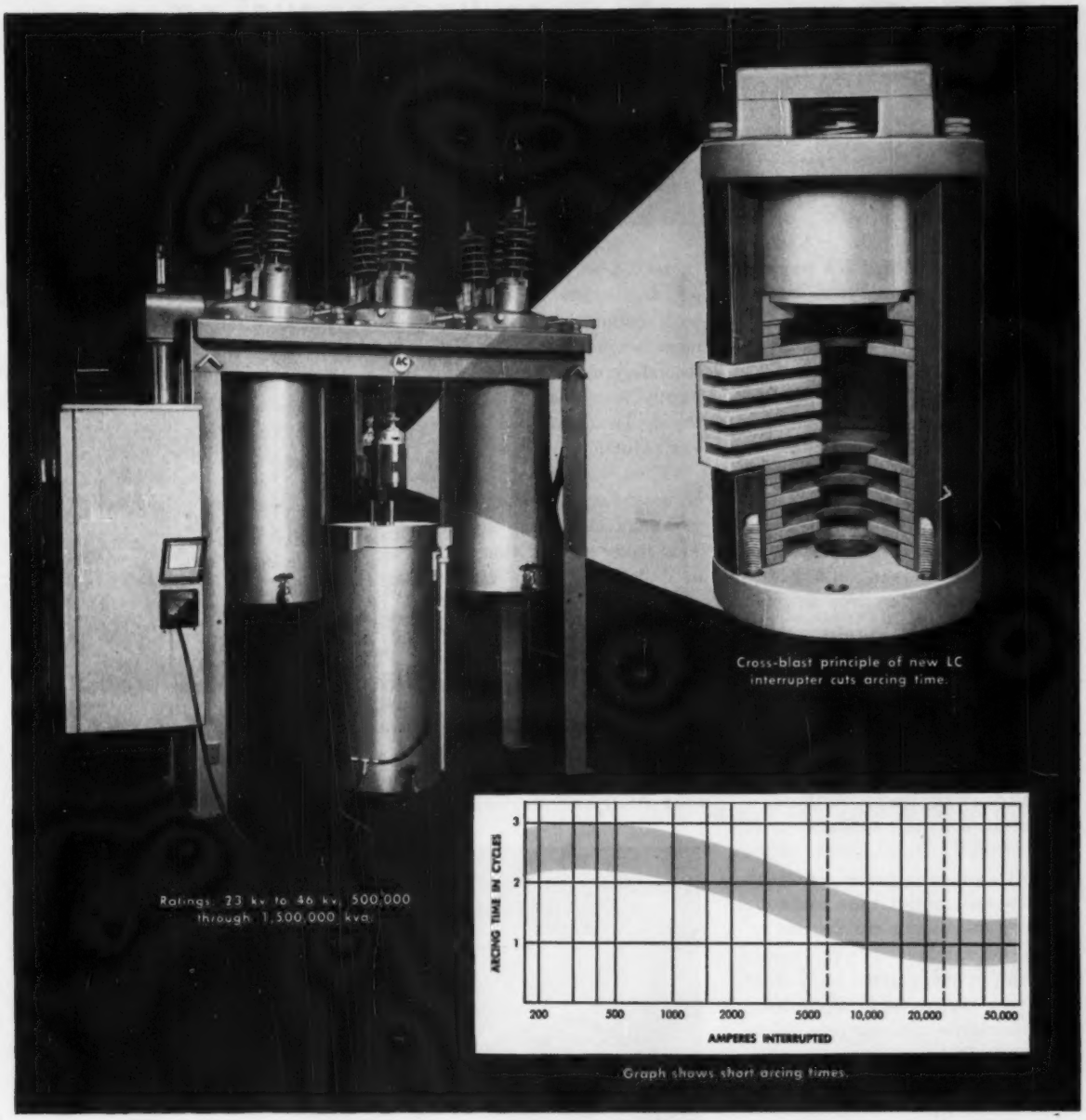
FOR AREAS ADJACENT TO SENSITIVE CROPS—LINE RIDER AMINE 22, alkyl amine salt formulation of 2,4-D, and 2,4,5-T containing 2 pounds each of acid equivalent per gallon. Applied as a water-borne spray.

FOR SPECIAL CONDITIONS—Also available are other standard LINE RIDER formulations, including Butyl and Low Volatile Esters of 2,4-D and 2,4,5-T containing 4 pounds of acid equivalent per gallon.

If you want deadly marksmanship, send for new LINE RIDER brochure giving details. Write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals

ALLIS-CHALMERS



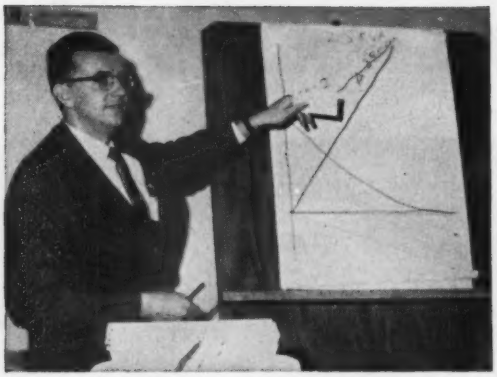
industry's newest interrupter

Here's new high-speed interrupting efficiency for Allis-Chalmers frame-mounted circuit breakers. New LC interrupter cuts arcing time. There's greater system protection, less oil contamination. Dielectric strength is extended, maintenance lowered.

More A-C breaker bonus benefits! You get mechanically trip-free operation. Highly successful *Pneu-Draulic* operator provides fast operation—ends moisture, rust, freezing. Hydraulic power-operated tank lifter cuts raising and lowering time by 80%.

For all the facts on these frame-mounted breakers, call your nearby A-C office or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*

Pneu-Draulic is an Allis-Chalmers trademark. A-1248



"Rochester Gas & Electric realizes annual savings of $.80 kvar with Secondary Capacitors"

*Harry G. Saddock, Rochester Gas & Electric Co.
Rochester, N. Y.

"We have approached the problem of justifying secondary capacitors from several different angles . . .

"An analysis of the economics of secondary capacitors from the standpoint of released capacity showed an annual saving of 50¢ per kvar per year exists at low densities.

"We also considered the secondary capacitor from a loss reduction viewpoint, and have concluded that secondary capacitors nearly pay for themselves from losses alone on 90% p.f. secondaries, and save an additional 50¢ per kvar per year at 80% p.f. Our study indicated that, in both instances, the first unit is the most beneficial . . . so that small-size secondary capacitors scattered uniformly over the system would be the ideal economic solution from the loss reduction standpoint.

"Then, we studied the economics of secondary capacitors from the viewpoint of voltage revenue gain. This study showed that the saving in dollars per kvar of secondary capacitors is about 40¢ per kvar.

"The advent of the meter socket type capacitor has also shown us a way to minimize all the important engineering time in application of our base capacitors. A good percentage of our base kvar may be supplied without sacrificing our diminishing pole space, without costly engineering time, and with a substantial annual savings, besides."

**A reprint of Mr. Saddock's paper, presented at the Second Annual Sangamo Capacitor Seminar, is available on request.*

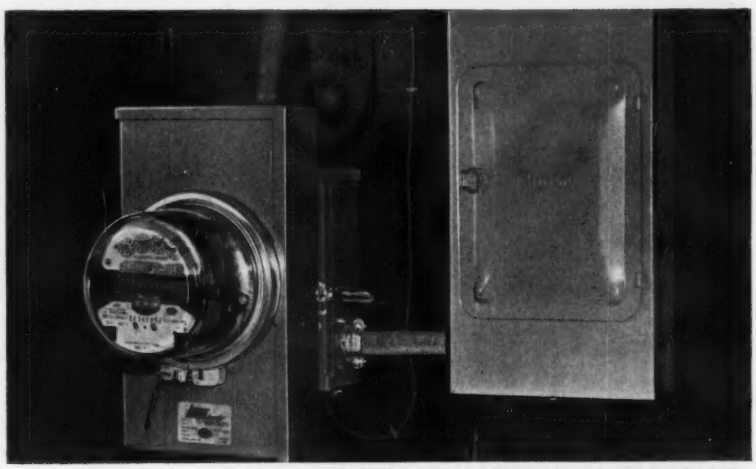
The Most Economical Secondary Capacitors to Install are Sangamo Secovars

Secovars—240 volt secondary capacitors—are easily installed right at the meter box to relieve the var load all down the line: from the service entrance to the secondaries, to the distribution transformer, to the power transformer, to the generator.

They cut installation costs . . . one-man installation realistically reduces the installed cost per kvar of Secovars in comparison to that of pole-type secondary capacitors. They conserve valuable pole space, too, and eliminate expensive engineering time.

Sangamo's exclusive Secovar Capacitors are available in three types to meet your requirements: Type OS (Original Socket) 2 kvar ratings; Type S, a 2 kvar rating for socket mountings; and Type N, a 1 or 3 kvar rating for nipple mountings. All types are fused, and some models can be furnished with a Klixon thermostatic switch if desired. All three feature weatherproof aluminum housings.

For the whole Secovar story, talk to your Sangamo Representative, or write for Bulletin 1132.



Typical meter socket Secovar Secondary Capacitor installation on the Rochester Gas & Electric Corporation system.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

PC60-1

Whenever linemen climb poles to repair or replace transformers, it costs money in lost revenue and added labor costs. These expenses are reflected in your earnings statement.

Capital for utility financing is naturally attracted to companies having a more favorable record of profits and this is why system dependability is one of the keys to utility financing.

every time he goes up—profits go down

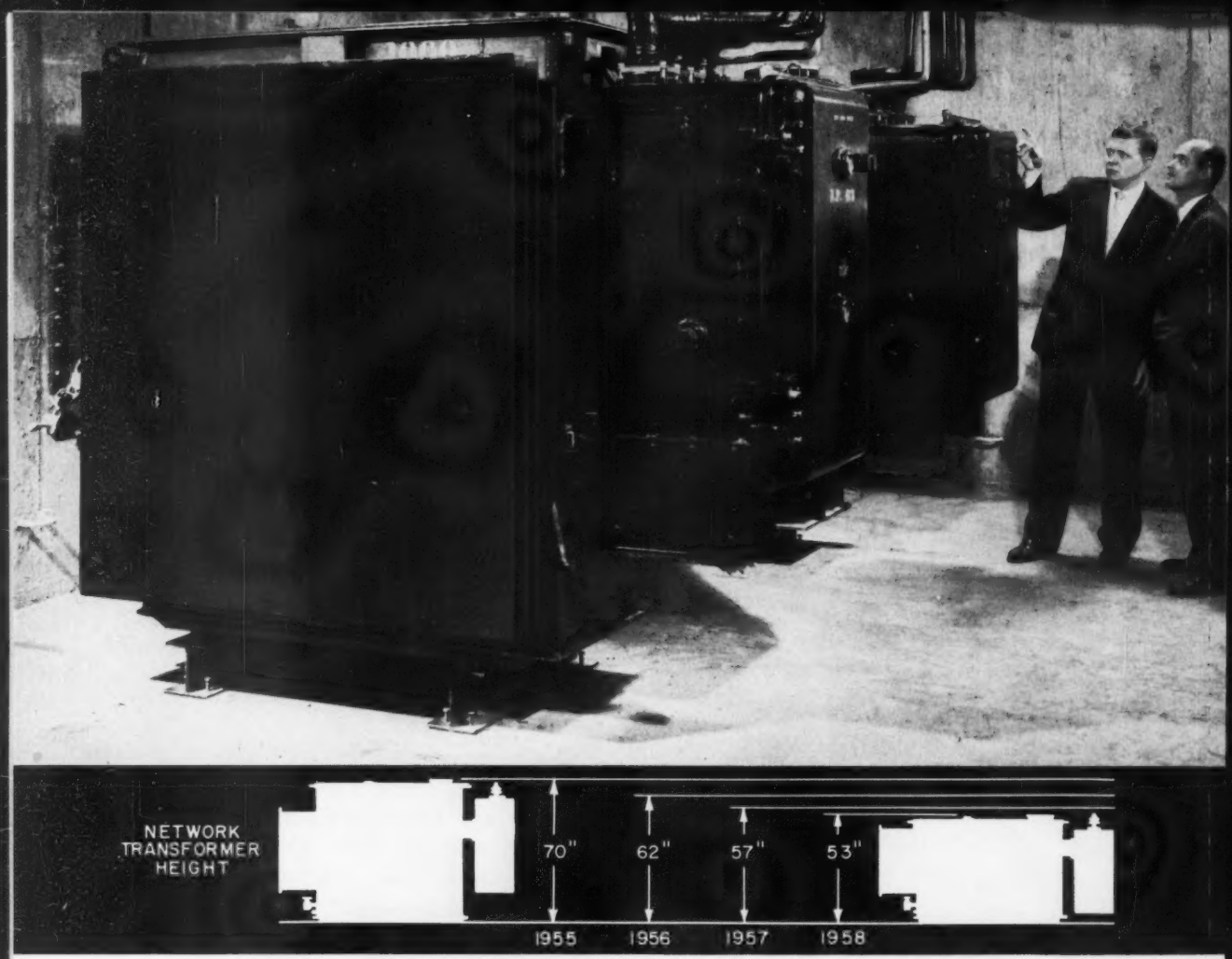
Progressive utility management, seeking methods of assuring system dependability, can specify Moloney Transformers which combine superior design with fine workmanship and materials to provide lower operating and maintenance costs.

Moloney Transformers . . . for More Power To You.

MOLONEY ELECTRIC COMPANY

Transformers for
Utilities, Industry and Electronic Applications

Sales Offices in All Principal Cities
Factories at St. Louis 20, Mo., and Toronto, Ont., Can.



General Electric engineers inspect recent Vaultmaster transformer installation. Insert shows dramatic size reductions—totaling 24%—made on 500-kva, 15-kv network transformer since 1955.

General Electric network transformers combine new features, old reliability to pace utility requirements

Not by tradition alone has the General Electric network transformer held its unquestioned rating as the No. 1 choice of the nation's electric utilities. Utilities know that *continuous* design innovations—backed by in-service reliability—keep the G-E "Vaultmaster" ahead of the field. For example, look at these major improvements made to G-E network transformers in the past 18 months:

- **Wound Evans Core** (July, 1958)—This important development utilizes the famous G-E Spirakore* core and results in a core-and-coil that has improved characteristics, yet is smaller and lighter.

- **"Sandwich" Paint Finish** (October, 1958) Melaprene, the best paint yet found to combat corrosion damage to network transformer finish, is applied *between* the primer and finish coats to provide extra-long finish life—altogether, five paint coatings are applied compared to three coats on other network transformers.

- **Alumina Bushings** (March, 1959)—The goal of a hermetically sealed network transformer was brought one step closer with this major advance. It eliminates the need for gaskets while reducing the throat height of the Vaultmaster unit by four to six inches.

- **Nitrile Gaskets** (November, 1959)—Both the high- and low-voltage ends of G-E network transformers are now protected by nitrile rubber gaskets—superior in sealing ability and reusable without requiring cement or other adhesive.

Thinking of a network installation this year? If so, be sure you have kept up with network-transformer advancements by keeping in touch with your General Electric Sales Engineer. Or, write for Bulletin GEA-5024 to Section 484-01, General Electric Co., Schenectady 5, N. Y.

* Reg. Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

The Electrical Week

LATE NEWS ▶

Washington Wire . . . Private utilities and preference customers disagree on whether preference customers would use full power output of Colorado River Storage Project. Utah P&L's Pres E. M. Naughton says preference requirements far less than potential . . . Interior Dept and USBR are changing bid forms to conform with General Accounting Office recommendations on Glen Canyon turbine bids (see p 66) . . . House Ways & Means Committee proposes taxes on domestic companies doing foreign business.

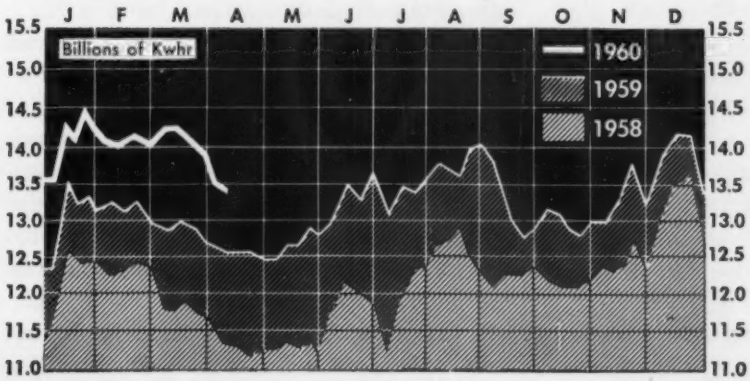
Around the States . . . Consumers Power settles 41-day strike with 10¢ increase and benefits . . . Pacific G&E gets PUC decision on accelerated amortization. Only taxes paid can be used for rates; AA can be used at utility's discretion on certified properties . . . Portland GE and IBEW agree to 4.3% wage hike.

Elections . . . Coldwater, Mich., voters defeat proposal to permit Consumers Power to operate in that city in conjunction with municipal utility. Vote was 903 to 834 in favor, but 3/5 majority was needed . . . Woodstock, Ill. citizens vote (1961 to 1153) to sell its municipal system to highest bidder. Commonwealth Ed believed to be only bidder . . . Tillamook County PUD and Pacific P&L agree on a $3,915,000 price for PP&L's distribution system that duplicates service. PUD will seek special election in fall for bond issue.

Rates . . . Puget Sound P&L gets PSC approval to up rates $3,634,000 a year . . . Toledo Ed asks city council to up rates by $1,710,000 a year. Company will also ask for increases outside Toledo.

Management changes . . . H. P. Forman to vp, Puget Sound P&L; M. K. Evans and P. T. Lagrone to vp, Westinghouse; R. K. Griffith to president, Riley Stoker, succeeding L. E. Griffith who becomes chairman, and J. D. Greensward to president, Canadian Allis-Chalmers.

WEEKLY POWER OUTPUT—Up 7.1% (Week ending Apr. 9), Kwhr 13,494,000,000



Per Cent Change From Previous Year

	Mar. 26	Apr. 2	Apr. 9
Total U. S.	+ 9.8	+ 7.3	+ 7.1
New Eng.	+ 8.1	+ 6.9	+ 7.7
Mid. Atlan....	+10.3	+ 7.7	+ 8.5
Cent. Ind.	+10.1	+ 7.3	+ 7.2
West Cent. ...	+ 8.7	+ 2.7	+ 7.2
Southeast	+12.7	+ 5.9	+ 6.9
South Cent. ...	+ 6.4	+ 7.6	+ 5.6
Rocky Mount...	+ 6.0	+ 7.7	+ 7.7
Pacific			
NW	+ 4.2	+ 7.9	+ 4.1
SW	+10.8	+ 8.8	+ 7.5

Seasonally Adjusted Index 270.8

Week Ago 270.6 Year Ago 251.6

Source: Edison Electric Institute

Preview of This Issue

EVENTS ▶ **Northwest Public Power Association delegates differ** on advisability of Nez Perce filing in view of lack of solution of fish passage questions **(p 67)** . . . Baldwin-Lima-Hamilton is designated legitimate low bidder to supply turbines for Glen Canyon project **(p 66)** . . . St. Lawrence Power Project shows estimated annual savings of $4 million to rural and domestic consumers of power **(p 64)** . . . Allis-Chalmers Mfg Co and I-T-E Circuit Breaker Co, and three A-C individuals have entered guilty pleas in the government's antitrust case against electrical equipment manufacturers **(p 70).**

MANAGEMENT ▶ **A progress report on the Russian electric power situation** by Philip Sporn, president of American Electric Power, comes at the end of the first year of the USSR's current seven-year plan. Sporn cites the report of Minister Novikov, and discussion by Premier Khrushchev in analyzing Russian progress **(p 71).**

Vast changes will sweep the labor force by 1970. According to the Dept of Labor, there will be more women workers and more youngsters earning a living. Technical people and professionals will be able to select from 41% more jobs, but the unskilled will find few new openings. Young executives—in the 34 to 45 age bracket—will be

Politics and Public Power

AN IMPORTANT PROBLEM IN THE 60'S

Among the important problems with which the electric utility industry will have to deal during the Sixties, the matter of defining service territories in areas now rapidly becoming urbanized will rank near the top of the list. All indications point to a long, continuing series of fights between city-based utilities (both publicly and privately owned) on one side, and rural electric co-ops on the other.

Consider some of the long-range general developments which have or will soon affect the situation:

- About 97% of the nation's farms are electrified. There is very little, if any, "horizontal" electrical growth potential in the rural areas.
- The number of farms in the U.S. is decreasing. This means, of course, that the number of farm meters is decreasing also. It must be added, however, that on the farms remaining (they are usually the larger "factory" farms), electrical consumption is on the rise. This is to be expected as more machinery and equipment boosts farm productivity.
- The urban areas around our cities, already mushrooming, will continue to grow larger, and the number of cases in which they impinge on what was once rural country will increase. In addition, these areas will become even more attractive from the electrical-growth viewpoint, both "horizontal" and "vertical."

These developments have resulted in territorial conflicts already. In Georgia, the two-year fight between the municipals and the co-ops was settled only recently by compromise. The terms of settlement were enacted into law by the state legislature.

In Colorado, the state supreme court recently upheld the right of two private utility

in critically short supply. For a rundown on how some of the electric utilities say they will meet the problems ahead, turn to **p 121.**

SPECIAL REPORT ▶ COMMERCIAL COOKING

Commercial electric cooking has come into its own, and is now a full-fledged member of the commercial load family. Results in this EW report, based on Hotpoint's 1959 survey, show 72 utilities added 455,971 kw in new cooking load during '59. EAR came to almost $11 million. The eight-pager begins on **p 75.**

PROCUREMENT & PRODUCTS ▶

Heavy fuel oil prices edged up 10-15¢ a barrel on the Gulf Coast in recent weeks . . . Electric utilities burned record amount of oil in January—10.62 million barrels . . . TVA awards $5,902,164 worth of coal contracts **(p 93)** . . . Equipment is readied for GE's Project EHV . . . Eddystone line on the first aluminum towers, by Alcoa, is energized **(p 96).**

SELLING ▶

Two successful sales campaigns . . . Public Service of Oklahoma freezer push yields sales which are double quota, and Southwestern PS portable heater promotion sells 3,850 units **(p 127).**

NEXT WEEK ▶

Be sure your supervisory people see the second EUM Special Report.

companies, long serving the Denver metropolitan area, to serve several suburbs contested by a cooperative.

In Illinois, a battle appears to be shaping up between Illinois Power Co and Southern Illinois Power Cooperative, a G&T co-op formed by three other Illinois co-ops. The G&T recently received the largest loan ever made by REA—$25.8 million—to build a 90,000-kw plant.

IPCO Pres Allen Van Wyck claims that the new G&T co-op will compete directly with his company for down-state commercial and industrial customers. Accordingly, he has announced that IPCO will petition the Illinois Commerce Commission to have the G&T declared a public utility, thus making it subject to regulation—especially regulation regarding the area jurisdiction.

Southern Illinois Power Co-op, on the other hand, has denied that the G&T has been set up to compete with IPCO. Its president, Raymond S. Holt, says that its federal loan contract prohibits the co-op from serving areas or customers served by Illinois Power. However, Holt said that the new co-op would seek customers among the industries that are now in rural areas or that may move into its area. "We desire to serve only our membership," he said, "but if any industrial customers come into our rural service area, we'll pick them up."

These three incidents—in Georgia, Colorado, and Illinois—are merely signs of things to come. They will arise, in most cases, not from pirating, but from economic trends outside the utility business itself.

It would seem that all parties involved—private, public, and cooperative— would do well to begin thinking about mutual planning in this area so that the problems can be settled in an atmosphere of reasonableness rather than acrimony.

Nuclear Notes

Full-power operation at Dresden will be authorized, the AEC has announced, barring the filing of objections prior to a hearing scheduled for May 4. The license now held by Commonwealth Edison permits half-power operation for tests. The utility predicts it will be at half power by the end of this month and perhaps reach the full 180 Mw by summer. The Dresden reactor went critical again March 30 after being shut down for revisions to the control rod assemblies.

Hearing on PG&E's Humboldt Bay nuclear plant was postponed at the company's request. The utility will make further tests of its pressure suppression design and will have to file again for a hearing. The postponed session was scheduled for April 14.

Nuclear industry's campaign for a greater share in the government's atomic energy program will be pressed by a new permanent committee set up by the U. S. Chamber of Commerce. Chairman is Philip N. Powers of Purdue Univ. Members include Harllee Branch Jr, president of the Southern Co, and representatives of industry and education. Their program is to establish principles for "reducing AEC competition with industry," then obtain the Commission's cooperation in realizing the aims. Leaders of AEC and the Joint Committee on Atomic Energy have shown stiff opposition.

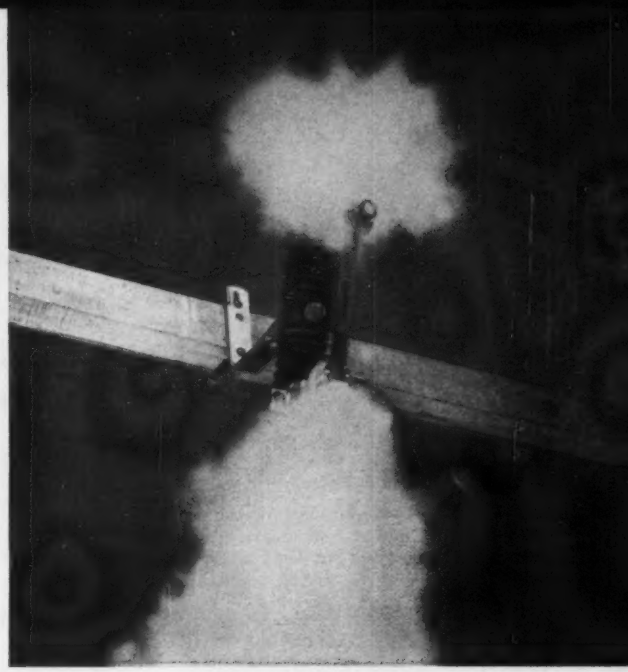
Reactor cost breakdown published by the AEC shows that electric utilities incurred nearly $36 of $60 million total costs for civilian nuclear reactor projects during the quarter ending last Dec 31. All but $2 million of the utility share was for plant and equipment, fuel fabrication and land. This brought total costs for U. S. civilian reactor projects under construction or design to $504 million, $277 million of it by electric utilities. Of the last figure, nearly a quarter billion has gone into plants and facilities and $29 million to research and development.

Unsolicited proposals for reactors will now be considered by the AEC upon submission instead of semiannually. The New Reactor Concepts Board, which formerly considered such proposals each March and September, has been abolished. Existing AEC units have taken over its duties. Four proposals are now under consideration.

BONUS, Puerto Rico's 16.3-Mw boiling nuclear superheat reactor, comes up for safety hearing before the AEC on April 27 in San Juan. The BONUS project is to be built under conditions laid down for second round plants of AEC's power demonstration reactor program. AEC's cost is to be $11 million; Puerto Rico Water Resources Authority's is $8.5 million.

State-sponsored nuclear energy industrial research center on Cape Cod is being pushed by the Massachusetts legislature. Proposed bill for launching a nuclear park bars the state from competing with private utilities in commercial generation, hence has the endorsement of local business and industry.

LINE MATERIAL concentrates all engineering, testing and manufacturing efforts in one direction—*highest quality equipment for the electric power industry.* And L-M came to you to find what you wanted in the best possible open type fuse cutout. The New LMO incorporates every important feature you asked for.



A 240,000 kva TEST on a 15 kv 100 ampere Type LMO Distribution Cutout at L-M's Thomas A. Edison Short Circuit Laboratory. This cutout repeatedly interrupts 16,000 ampere faults. Many tests like this prove the LMO cutout *Totally Tested* under all possible operating conditions.

This New Totally Tested Distribution Cutout Has All Features Electric Utilities Wanted

Drawing upon its more than 35 years experience in the engineering, testing and manufacture of distribution fuse cutouts, L-M has produced the new Type LMO open type fuse cutout.

Totally Tested in L-M's Thomas A. Edison Short Circuit Laboratory at Franksville, Wisconsin, with hundreds of tests, the new Type LMO has proved reliability, proved interrupting capacity and proved safety through its entire operating range.

The new Type LMO distribution fuse cutout has all the important features you asked for. Features heading the list:

1. Non-ferrous construction
2. Positive latching
3. High interrupting capacity
4. Rugged multiple contacts
5. Complete birdproofing
6. Choice of terminals—aluminum or bronze
7. Spring loaded interlocking flipper

Get Complete Information. Ask your Field Engineer to show you: the sample of the new Type LMO cutout; the Type LMO Bulletin No. FC3; the Type LMO Movie. Contact your L-M Field Engineer or write Line Material Industries, Milwaukee 1, Wis. In Canada: CLM Industries, McGraw-Edison (Canada) Ltd., Toronto 13, Can.

TYPE LMO RATINGS

VOLTAGE RATING KV	CURRENT RATING AMPS	INTERRUPTING CAPACITY AMPERES—ASYMMETRICAL			
		HEAVY-DUTY		EXTRA-HEAVY-DUTY	
		Non-Expendable Cap	Expendable Cap	Non-Expendable Cap	Expendable Cap
7.8	100	5000	10000	10000	20000
15	100	4000	8000	8000	16000
27	100	3000	6000	—	—

Interchangeable Fuseholders: ratings may be changed simply by changing the fuseholder. Choice of heavy-duty or extra-heavy-duty fuseholders; 200-ampere disconnecting blade; link-break fuseholder. This interchangeability offers convenience and savings in labor, material, and stocking costs.

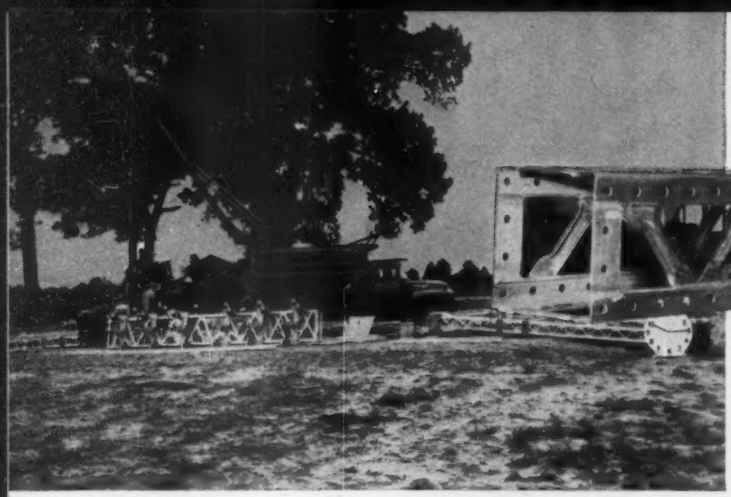
LINE MATERIAL Industries

McGRAW-EDISON COMPANY

SPECIALISTS IN DISTRIBUTION EQUIPMENT

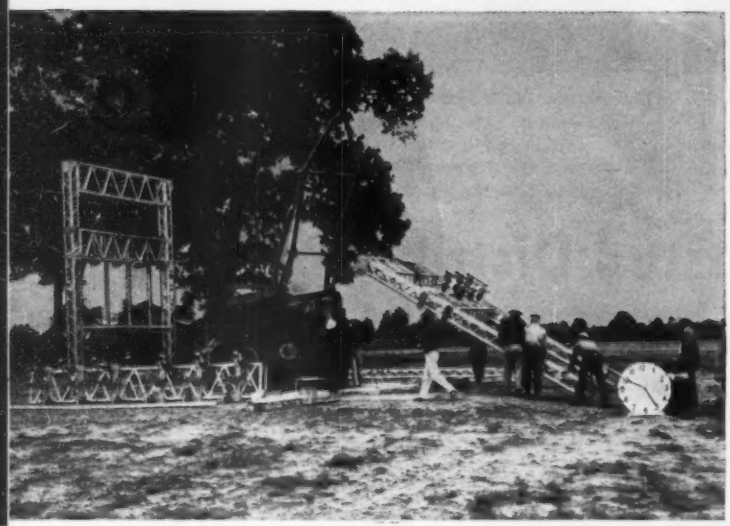
434

DISTRIBUTION TRANSFORMERS • RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE & CONDUIT

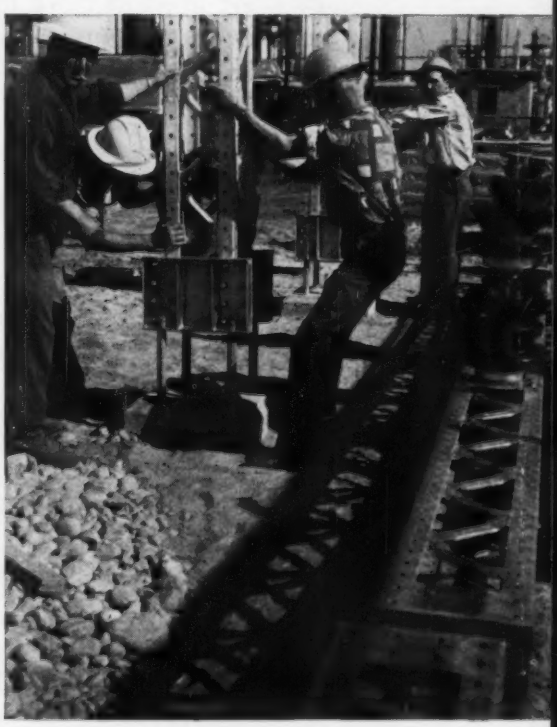


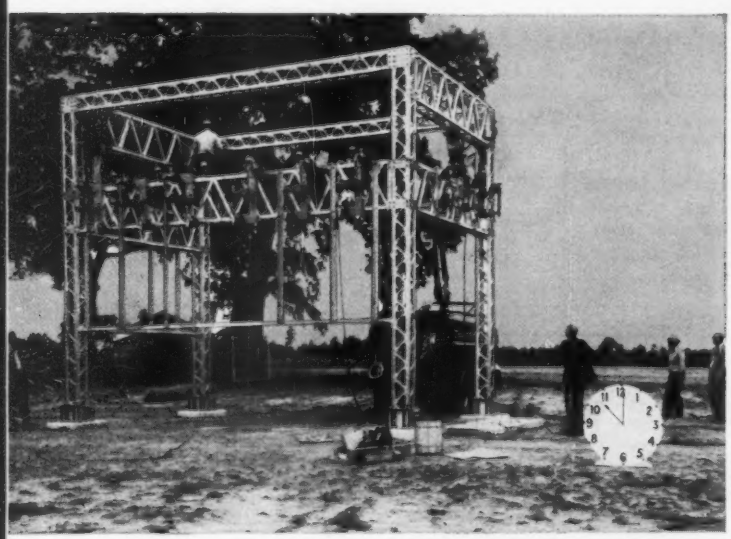
10:15 A.M. Erection of the L-M-Alrectic substation commenced. Linemen use their regular line-truck hydraulic hoist. Columns and trusses were bolted together, and equipment was mounted before the sub-assemblies were erected.

THE SPECIAL DESIGN and construction of L-M-Alrectic substation trusses provide the strength of steel at less than ⅓ the weight. Trusses can be handled on the ground without the aid of mechanical equipment.



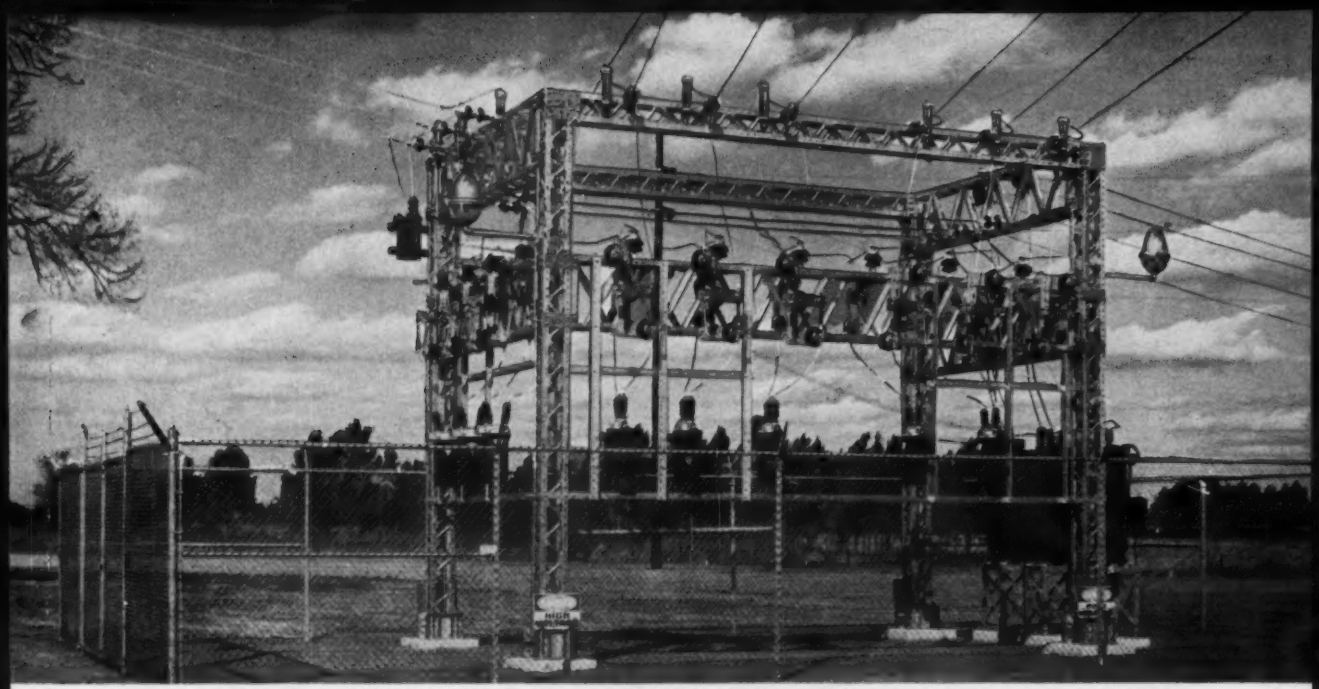
10:25 A.M. In only ten minutes, one column and horizontal truss sub-assembly are already erected. The second is being erected here.





11:03 A.M. Within 48 minutes, the entire Alrectic structure is erected and ready for bus work. Only 18 working hours after material was received the station was ready to be energized.

THE EASE with which this crew guides the base plate over the anchor bolts shows why installation of L-M-Alrectic substations is faster and more economical.



THIS 12 kv REGULATED SWITCHING STATION was erected by a line crew in only 48 minutes. Although this crew had no previous erection experience, the men were still able to install this L-M-Alrectic aluminum substation in an amazingly short time. Columns and horizontal trusses were bolted together and equipment was mounted before the sub-assemblies were erected. Sub-assemblies were then hoisted by means of the regular line-truck hydraulic hoist.

L-M-Alrectic® Aluminum Substations Are Competitive With Steel Structures

Special light-weight design, which facilitates faster installations, makes L-M's aluminum substations competitive with steel substations on an erected basis.

by **W. V. SWAN**
Product Manager
Power Switching • Substations
Line Material Industries

L-M-Alrectic aluminum substations are constructed with standard factory-assembled trusses. Each truss consists of specially designed extruded chord-angles and lacing members that are factory-welded, using fixtures. Because of special design and construction, Alrectic trusses weigh only 30% of comparable steel trusses, but bear equal stresses.

Fast, Economical Installation

Column and horizontal trusses are all pre-assembled when delivered to the job site. They need only to be laid out and bolted together. Alrectic substations are fabricated of aluminum and require no special treatment—no painting, no maintenance. As a result, distortion from galvanizing is eliminated and assembly problems are minimized.

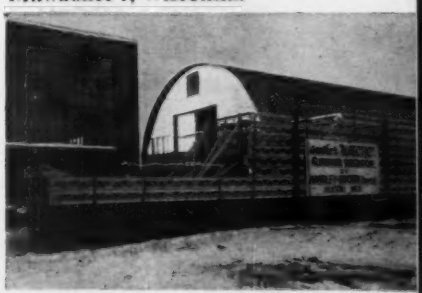
Because of lighter weight, the trusses are easy to handle. Much of the structure can be ground-assembled without a crane. Ground-assembled structures can then be lifted into place with light-duty lifting equipment. Erection of Alrectic substations is easier, faster and, above all, more economical.

Alrectic Competitive with Steel Substations

Special light-weight construction, most economical design, and fast economical installation make it possible for L-M to supply the Alrectic aluminum substation at costs equal to and, in many cases, lower than, steel structures.

Get Complete Information

Be sure you contact your L-M Field Engineer and get all the facts on the Alrectic aluminum substation. The next time you plan a substation, ask your L-M Field Engineer to submit a bid on an aluminum structure. Or write me at Line Material Industries, Milwaukee 1, Wisconsin.



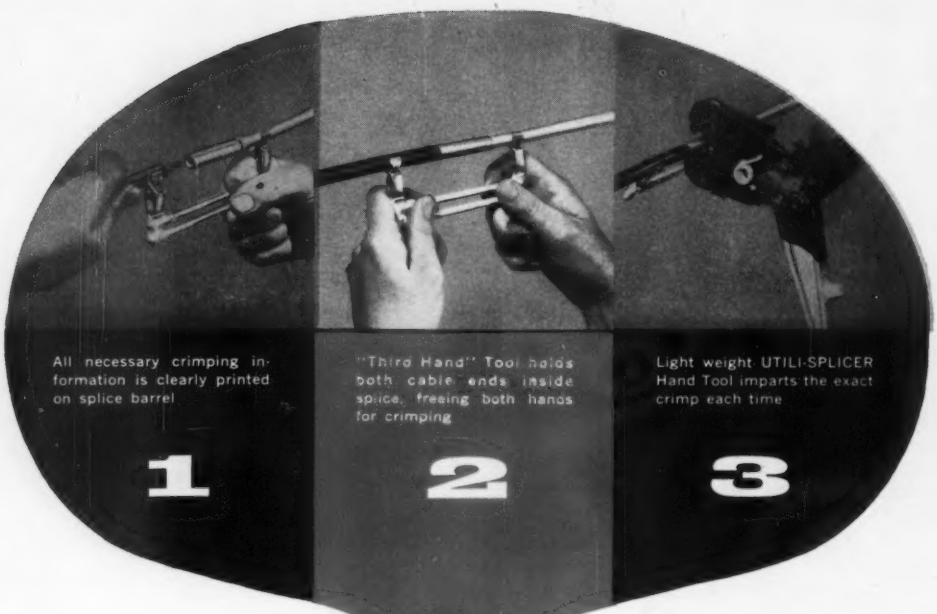
ALL ALRECTIC columns and trusses are fabricated at the factory and are shipped pre-assembled. Light-weight design permits shipping the entire substation on one truck or rail car.

® Registered trademark of Handley-Brown Company

LINE MATERIAL Industries
McGRAW-EDISON COMPANY
439 **Substations and Power Switching Equipment**

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE & CONDUIT


All necessary crimping information is clearly printed on splice barrel
1
"Third Hand" Tool holds both cable ends inside splice, freeing both hands for crimping
2
Light weight UTILI-SPLICER Hand Tool imparts the exact crimp each time
3

SIMPLICITY!

Now, the AMP Step-Down UTILI-SPLICE, combined with the new light weight crimping tool and the "Third Hand" Tool, give you still greater economies in your step down splices, savings in man-hours plus AMP's reliable attachment method. For all stranded, solid or ACSR conductor combinations in copper and/or aluminum . . . wire size range #8 through #1/0 AWG.

Send for more information today.

CHECK OFF THESE ADDITIONAL HIGHLIGHTS:

- **long-life corrosion resistance from special tin plating and from inhibitor-sealing compound that pre-cleans contact surfaces**
- **splice lengths proportioned to the cross section of cable**
- **optimum heat dissipation**
- **wire-stops assure proper insertion depth of stripped cable**
- **maintenance free**

American Pamcor, Inc.

GENERAL OFFICES: 181 HILLCREST AVE., HAVERTOWN, PA.

Exclusive Distributor For AMP Products To The Utility Industry

Cost-cutting step taken 26 years ago still paying off at Hamm Brewery —they chose NONPAREIL Turbine Oil

Situation: In 1934 the Theo. Hamm Brewing Company installed two 1,000 kw. turbines. The brewing firm wanted to be sure there would be no downtime due to failure of the lubricant. Neither did the company want to spend time checking the oil's performance or adding new oil to sweeten the old.

What was done: Brewery management followed the advice of the Standard Oil lubrication specialist. They installed NONPAREIL Turbine Oil, the only oil, then as now, that carries with each fill a life-of-turbine guarantee.

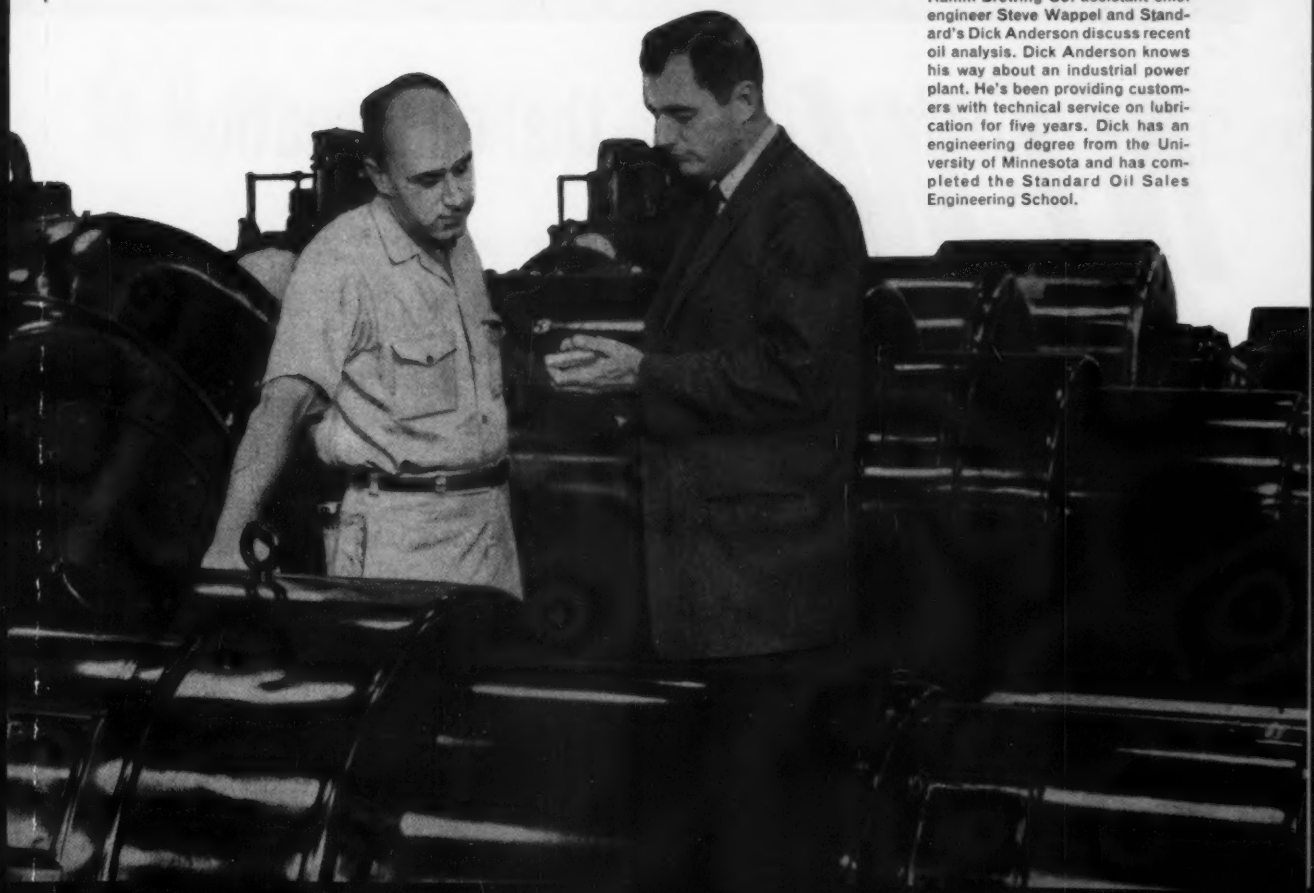
What has happened: In 26 years since the turbines were put in service there has never been any downtime due to lubrication problems. In 1947 a 2500 kw. turbine was added to the system and another 3000 kw. unit was put in service in 1953. These, too, have used NONPAREIL Turbine Oil with the same results.

What you can do: Get the full story on NONPAREIL Turbine Oil from the Standard Oil office near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about **NONPAREIL Turbine Oil**

- Will not permit formation of harmful acids
- Will not permit formation of sludge or oil varnish
- Will maintain good demulsibility or water separating characteristics
- Has high resistance to foaming
- Contains adequate rust inhibitor

You expect more from **STANDARD** *and you get it!*



Hamm Brewing Co. assistant chief engineer Steve Wappel and Standard's Dick Anderson discuss recent oil analysis. Dick Anderson knows his way about an industrial power plant. He's been providing customers with technical service on lubrication for five years. Dick has an engineering degree from the University of Minnesota and has completed the Standard Oil Sales Engineering School.

NEW! ...the combination of

the combination of these two equipment in designing or procuring components for

Write today for this brochure:
The New Story of
C. H. Wheeler Mfg. Co. / Griscom-Russell Co.
c/o C. H. Wheeler Mfg. Co.
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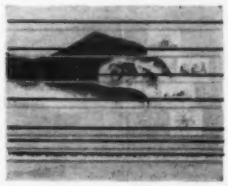

among the many components offered are: Condensers, Ejectors, Heat Exchangers — Bare Tube, Extended Surface Heat Exchangers,

C. H. Wheeler Mfg. Co. / Griscom-Russell Co.

lines offers important savings for management and engineering staffs engaged a variety of applications in power plants, marine, process and nuclear systems.

C. H. Wheeler Manufacturing Company, with 71 years' experience manufacturing condensers, ejectors, pumps and other components for the power, marine, process and nuclear industries, and Griscom-Russell, with 92 years' experience in the heat exchange field, are uniting to create an important pool of experience, products and services unmatched in industry today. The advantages offered by this combination are improved and increased selection, distribution and service, resulting in substantial savings for the current and potential customers of both companies.

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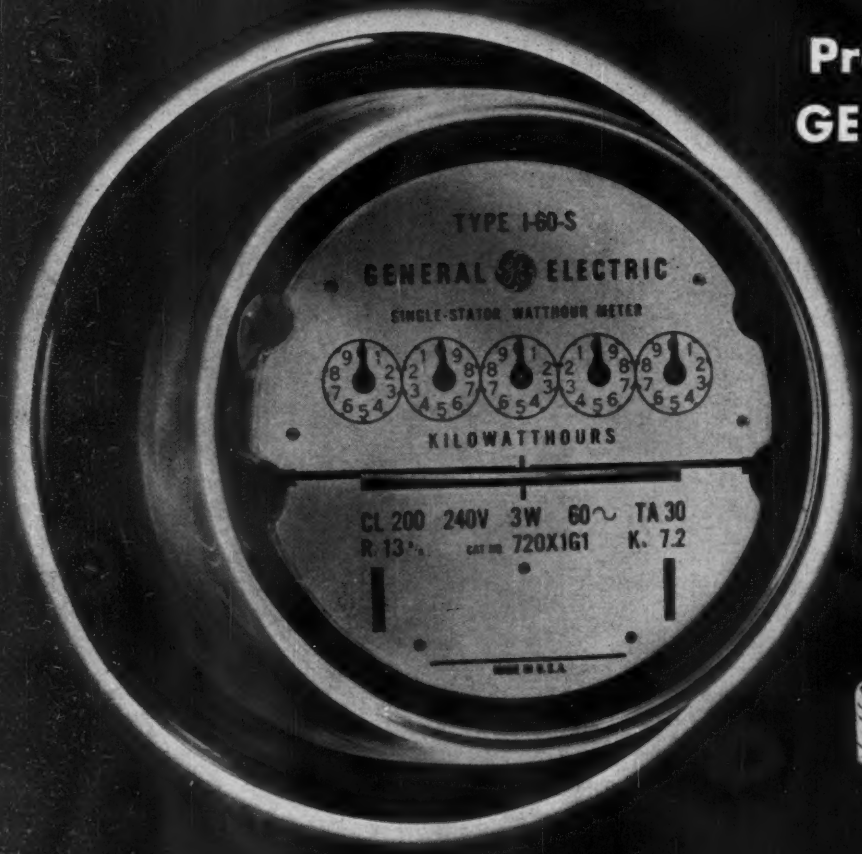
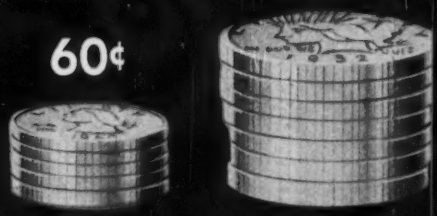
Evaporators, Marine Distilling Plants, Marine Systems, Pumps, Nuclear Components, Valve Actuators, Custom Fabrication and Machining



Present Worth of GE I-60 Magnetic Purchased



Today's purchase of each General Electric I-60 meter provides . . .

Up to $9.13 in EXTRA VALUE because

Each General Electric single-phase meter with magnetic suspension put in service today can save you up to $9.13 in present worth, $27.19 in gross revenue loss over 30 years . . . here's proof:

Assume an average kw-hr usage per consumer based on extrapolations of Electrical World forecasts per year for 30 years and the percent loss of registration for each of the 30 years (see graph at right for magnetic suspension vs. ball-bearing meters). Result: total loss for each ball-bearing meter would be 1141.3 kw-hrs *more* than for G-E's magnetic suspension meter. With an average cost of $.02382 per kw-hr in revenue loss, this means a gross total revenue loss of $27.19. At six percent annual interest, the "present worth" of the extra value (resulting from greater sustained accuracy) on every magnetic suspension I-60 meter purchased today is up to $9.13 . . . vital proof that, in metering, it pays to buy the BEST.

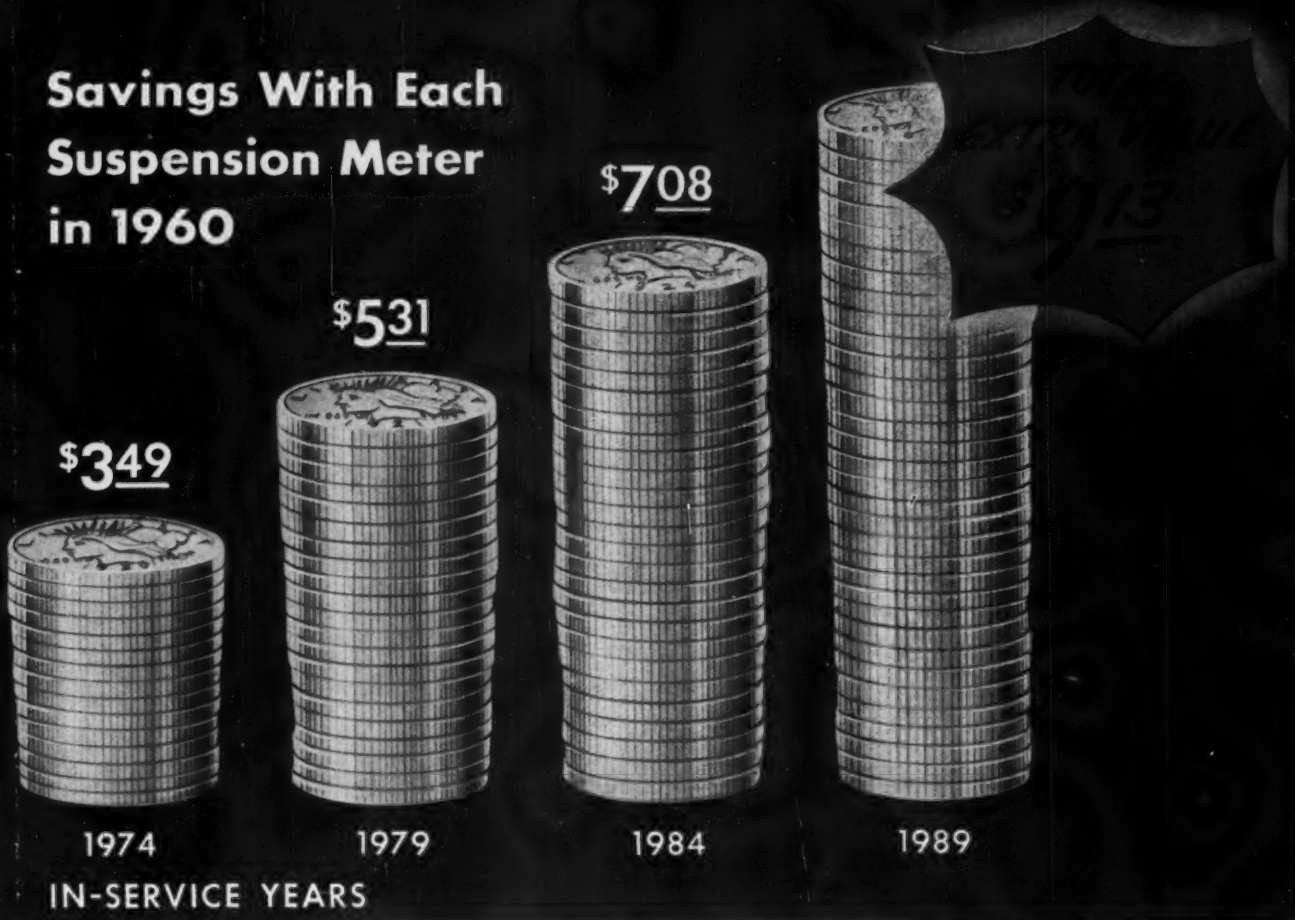
Like more information? Contact your General Electric Apparatus Salesman. Or, write General Electric Co., Somersworth, New Hampshire. 713-01

SERVING MEDALLION HOMES EQUIPPED BY GENERAL ELECTRIC

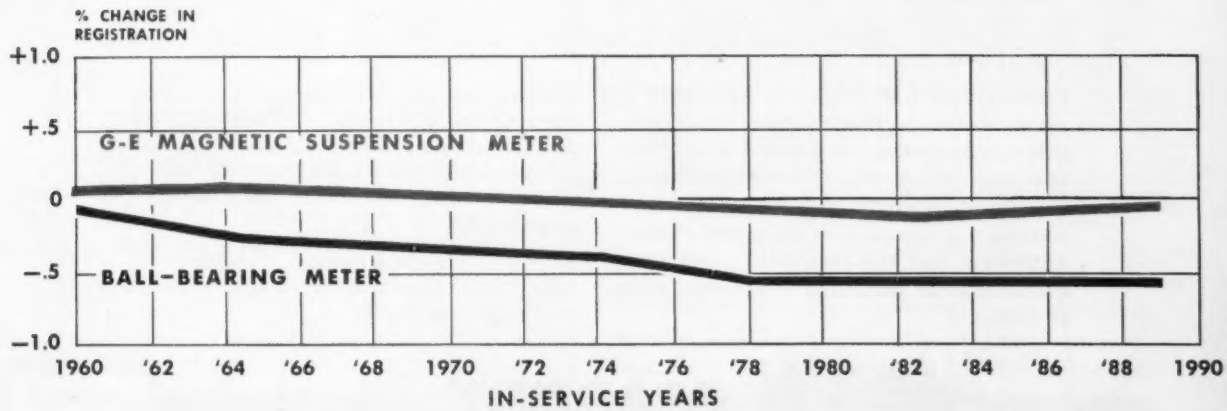
MEDALLION HOME — LIVE BETTER ELECTRICALLY

In metering, anything less than the best is too costly.

Savings With Each Suspension Meter in 1960



# of Greater Sustained Accuracy



METER DEPARTMENT

GENERAL ELECTRIC

PEABODY's Two Billion Tons Of Coal Reserves Assure You Of An Abundant Fuel Supply... Far Into The Future!

Peabody Coal Company's *two billion tons of proven reserves* are your assurance of a dependable source of fuel for the long pull. These reserves . . . along with Peabody's continuous development of productive mining properties—economically accessible to the nation's inland waterways and rail facilities . . . are your guarantee of an abundance of power for years to come.

Whether you use a carload or a trainload, your business is important to Peabody. From consultation on power problems to the end result Peabody offers a complete coal service. Contact your nearest Peabody office for complete details.

Now available... the Peabody Coal Company 1959 Annual Report. Write for your copy today! Department EW.

power for progress

PEABODY COAL COMPANY

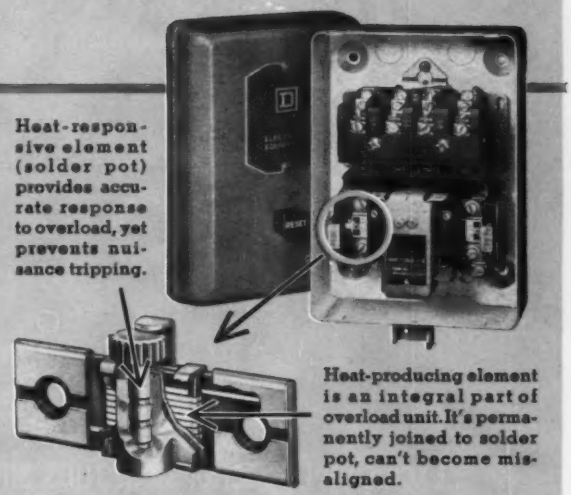
Peabody Plaza • 301 Olive Street • St. Louis 2, Missouri

Offices in: Chicago, Columbus, Des Moines, Detroit, Indianapolis, Kansas City, Louisville, Madison, Wis., Memphis, Minneapolis

ONLY SQUARE D STARTERS WITH ONE-PIECE OVERLOAD RELAYS GIVE ABSOLUTE PROTECTION!

• Only Square D makes thermal overload relays with 1-piece construction—and only with 1-piece construction can you *know* you've installed the heater correctly. Square D 1-piece overload relays can be installed only one way. They are factory-assembled, individually tested and calibrated, completely tamper-proof. Repeated tripping will not affect accuracy.

You *pay* for overload protection—be sure you *get* it. Insist on Square D 1-piece overload relays for *absolute* protection.


Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.
Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

EXCLUSIVE—1-piece Overload Relay for ABSOLUTE Protection!

Mail coupon today for simple "jig-saw" demonstrator—see why only Square D gives absolute protection

Square D Company
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4041 North Richards Street
Milwaukee 12, Wisconsin

Please send me information on Square D magnetic starters, along with your simple 3-minute "jig-saw" demonstrator

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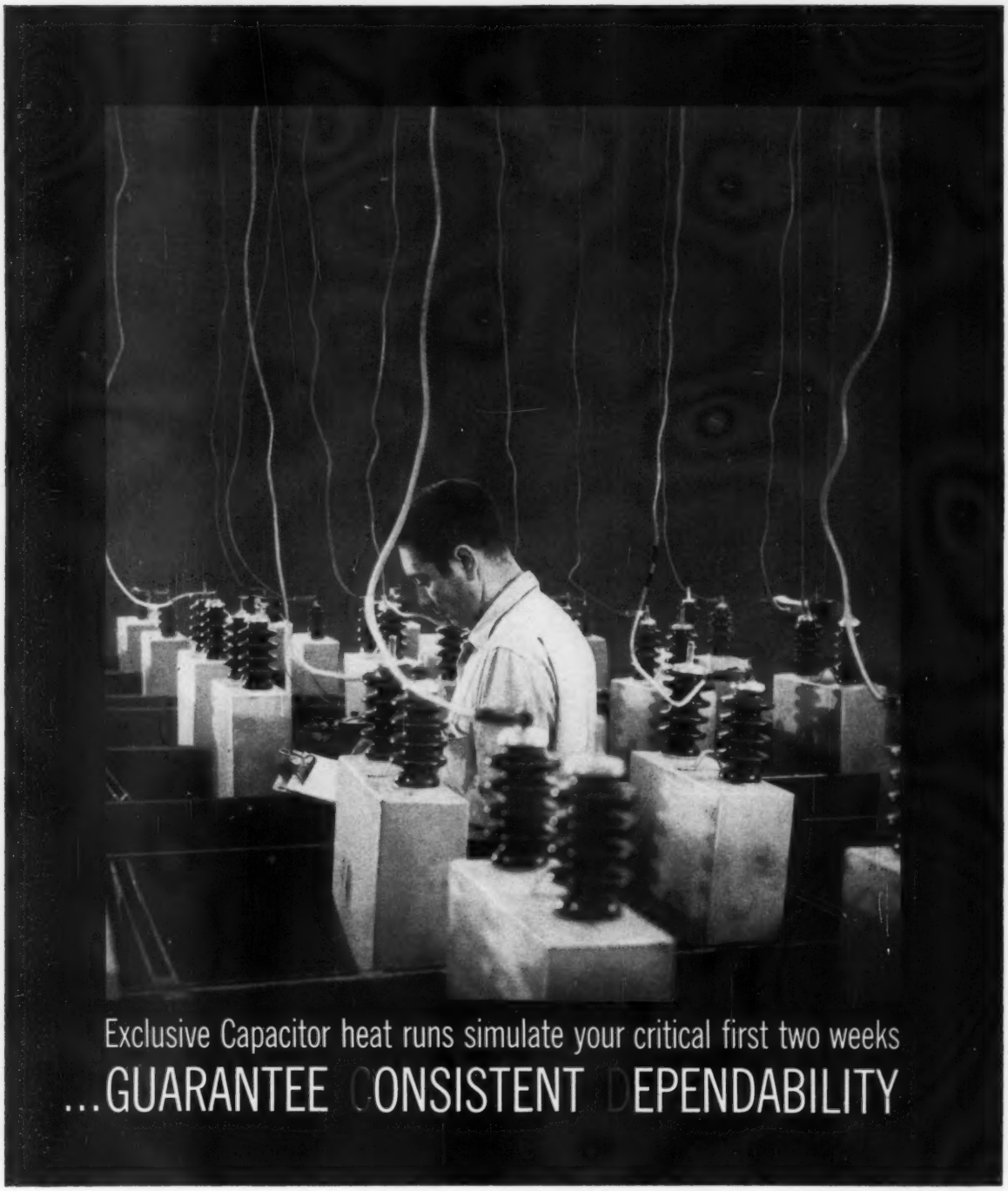
SQUARE D COMPANY

wherever electricity is distributed and controlled



Exclusive Capacitor heat runs simulate your critical first two weeks

...GUARANTEE CONSISTENT DEPENDABILITY

Full voltage heat runs and energization test—actually the equivalent of a capacitor's crucial first two weeks on the line—are conducted on every C-D capacitor before shipment. Only C-D capacitors are put to this test! ■ Additional capacitance, leak and dielectric tests have produced a matchless record of 99.6% reliability for the entire C-D line—your assurance of longest capacitor service life. True capacitor value... lowest volts per mil... power losses far below NEMA limits.

FPE **CORNELL-DUBILIER POWER CAPACITORS**

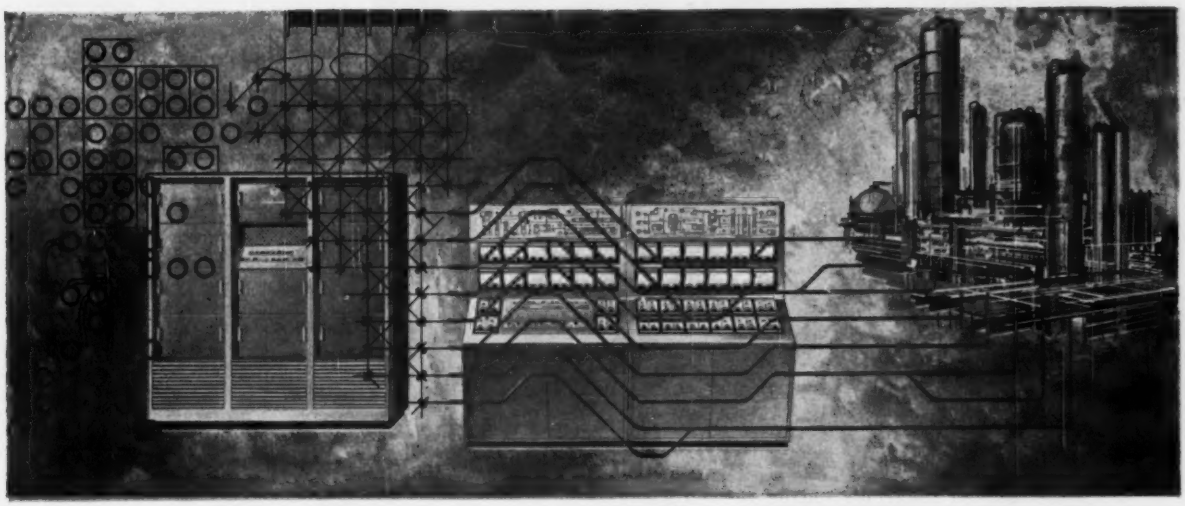
FEDERAL PACIFIC ELECTRIC COMPANY • 333 HAMILTON BOULEVARD, SO. PLAINFIELD, N. J.

the instruments

the computer

the systems engineering . . .

now Foxboro brings you all three



A dynamic new force in computing control is now available to the process industries. Foxboro, and the Radio Corporation of America, contributing their individual capabilities, bring industry its first completely integrated computing control system. From Foxboro, the instrumentation, the knowledge of process dynamics. From RCA, the digital computer, and its special electronic techniques. A breadth and depth of talent available with overall systems responsibility through The Foxboro Company. When you are investigating the feasibility of computing control, look into this new force. The Foxboro Company, 244 Norfolk St., Foxboro, Massachusetts, U. S. A.

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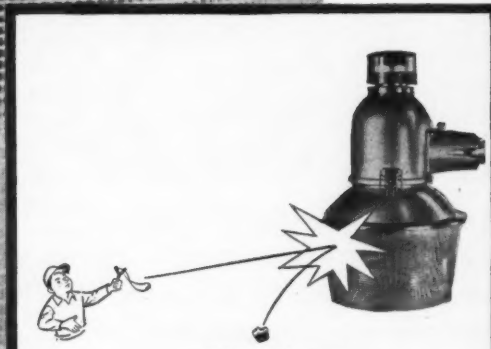
GENERAL ELECTRIC'S

Boosts by

"PRIVATE-LIGHTING" PACKAGES Especially for "private-lighting" applications, General Electric offers the Acrylic-Suburban luminaire in attractively priced equipment packages:

Cat. No. C648G017–Acrylic - Suburban luminaire complete with cadmium-sulphide photoelectric control, acrylic refractor, hood with 175-watt built-in ballast (lamp not included), 4-foot aluminum bracket.

Cat. No. C648G016–Acrylic - Suburban luminaire complete with cadmium-sulphide photoelectric control, acrylic refractor, hood for up to 6000-lumen filament lamp, mogul base, 7-inch light center (lamp not included), 4-foot aluminum bracket.



BB's and stones bounce off

NEW ACRYLIC-SUBURBAN LUMINAIRE

"private-lighting" profits cutting maintenance costs

Exclusive shatter-resistant plastic refractor tops money-saving features

Here's a luminaire designed and built to keep your maintenance trucks in the garage, and your "private-lighting" accounts on the profit side of the ledger. It's the new General Electric Acrylic-Suburban.

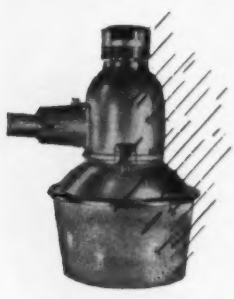
Realizing that repeated service calls can severely hamper any rural and suburban lighting program, General Electric has built into the Acrylic-Suburban these time- and money-saving features:

- The industry's first-and-only open refractor of durable plastic—virtually unbreakable in normal service—developed from General Electric's years of experience with acrylic refractors for mercury luminaires such as the M-250. This precision-molded refractor is more costly to make than glass and offers more resistance to all causes of breakage, yet you pay *no premium* in price. It has the same high transmissivity as glass, and is interchangeable with many standard glass refractors. One-fourth the weight of glass, it's far easier to install.
- General Electric's dependable cadmium-sulphide photoelectric control, which mounts right on the locking-type hood for automatic dusk-to-dawn operation. It's built and tested for years of reliable, trouble-free performance.
- Long-life ballasts built right into the hood for mercury lamps up to 250 watts (hoods without ballast for up to 6000-lumen filament). Since mercury lamps generally last two to three times longer than filament, this means far fewer service calls for relamping.

It all adds up to a luminaire you can install and forget. Whether it's for suburban streets, commercial establishments, or areas around private homes and farms, the General Electric Acrylic-Suburban can mean increased lighting profits for you. For full details and immediate shipment from stock, call your General Electric Apparatus Sales Engineer or Agent. General Electric Company, Outdoor Lighting Dept., Hendersonville, North Carolina. 460-01

Progress Is Our Most Important Product

GENERAL ELECTRIC



resists thermal shock of cold rain

unaffected by corrosive atmosphere or blowing sand

.22 bullets penetrate but will not shatter

NOW

Alcoa aluminum patented integral web channel bus available in 8 sizes

You can now get **all** the advantages of aluminum integral web channel bus in a new broad range of sizes.

This patented* design, introduced by Alcoa in 1956, has been expanded to eight sizes, providing capacities from 2,800 to 12,000 amperes.

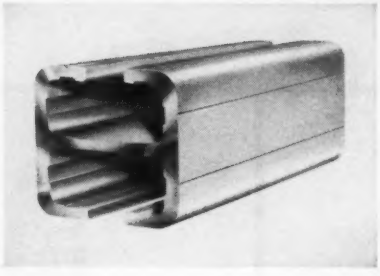
The web construction provides an integral shape for a bus conductor having unusual mechanical strength and high electrical efficiency. The large section modulus offers high structural strength to resist external loading and short-circuit stresses. The economical disposition of metal provides high current-carrying capacity at a low cost.

Moreover, you can make joints, taps, and splices by clamping, bolting, or welding. The table shows the sizes, capacities and weights from which you can choose to meet your exact needs.

Additional sizes can be designed to meet other specific needs. For complete information, contact your Rome representative. Or, if you'd like a copy of our "Alcoa Aluminum Bus Conductor Handbook," write: Rome Cable Division of Alcoa, Dept. 3-40, Rome, N. Y.

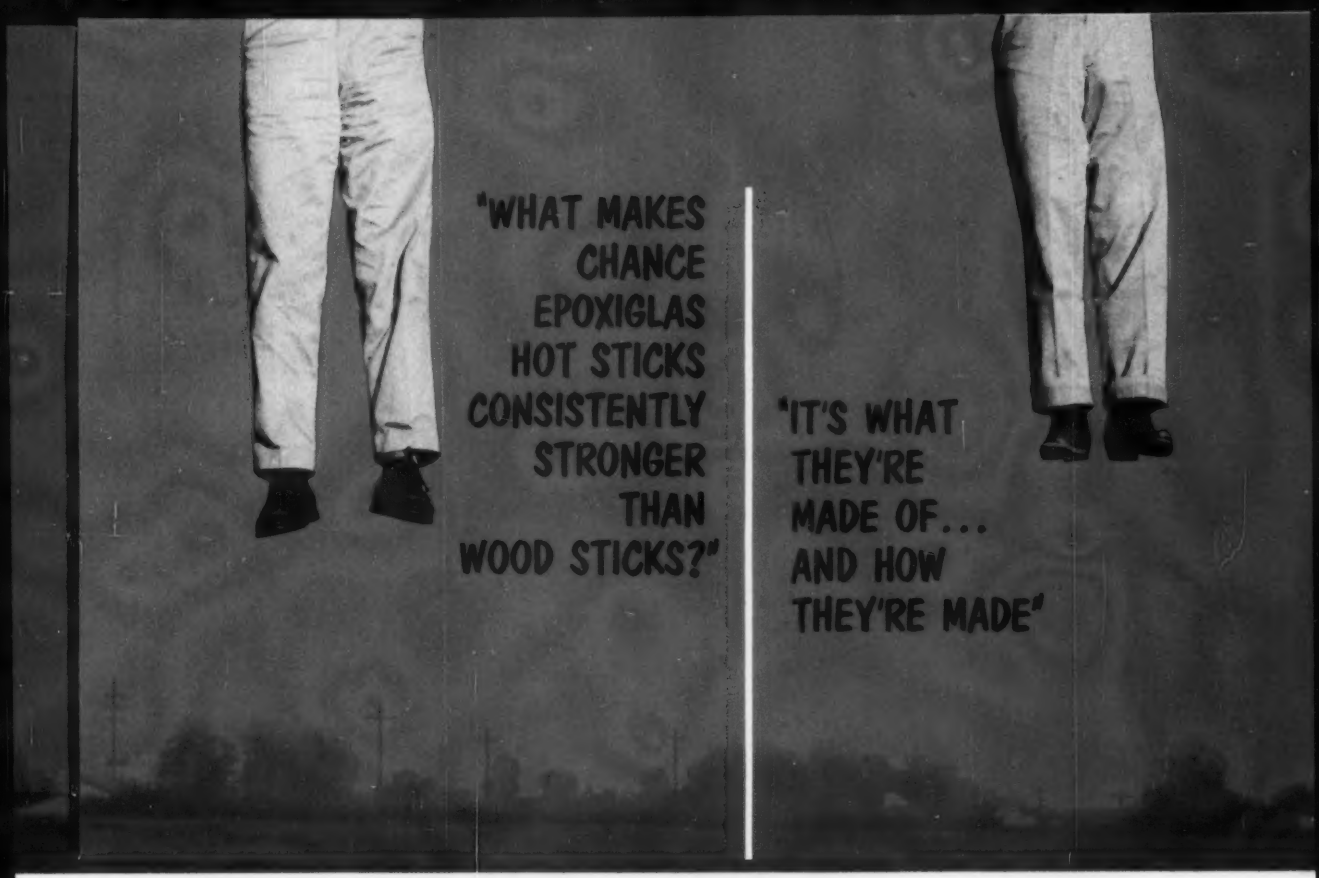
*PATENT NO. 2,904,621

Size	Nominal Current† (amperes)	Wt./ft. (lbs.)
4 x 4	2,800	5.4
4 x 6	3,500	7.1
5 x 6	4,050	8.9
5 x 8	5,000	11.7
6 x 6	5,000	14.2
8 x 8	7,000	19.0
11 x 11	10,000	31.0
12 x 12	12,000	38.0

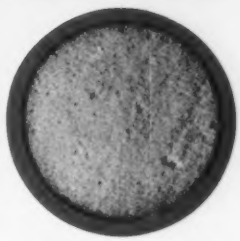


†Based on 30°C rise above 40°C ambient still air

ROME CABLE
DIVISION OF **ALCOA**


"WHAT MAKES CHANCE EPOXIGLAS HOT STICKS CONSISTENTLY STRONGER THAN WOOD STICKS?"
"IT'S WHAT THEY'RE MADE OF... AND HOW THEY'RE MADE"

CHANCE *Epoxiglas* HOT STICK



Up there in the air . . . that's close to 400 pounds of Chance Tool Demonstrators hanging from a 1½ inch Epoxiglas pole. No horseplay this, but a show of the pole's strength. Now, here are some down-to-earth facts about this new hot stick development . . . facts important to Safety Engineers, Maintenance Men, and budget-conscious Supervisors . . .

Chance Epoxiglas poles *are* consistently stronger than wood. And, every pole of the same size is identical, because each stick is a section cut from a continuously-produced, never-ending cylinder of Epoxiglas made by a manufacturing process that remains constant. The process: thousands of epoxy resin-coated glass fibers are wound around, and laid length-wise over, a unicellular plastic foam core. Core and fibers are bonded together by the epoxy, then oven-cured to form an almost indestructible pole.

Since Epoxiglas poles are practically destruction-proof, maintenance costs are negligible. The poles' finish is immune to solvents, too . . . tools are easy to clean. And, their bright color gives them high visibility—a definite advantage for linemen and observing supervisors.

Most important of all, Epoxiglas ends the moisture problems that cause trouble with ordinary hot sticks. Even complete, underwater immersion doesn't affect the insulating qualities of an Epoxiglas pole. Just wipe off a wet pole with a dry cloth, and it's immediately usable . . . completely safe on high voltage transmission lines.

Sound good? It is, for Chance Epoxiglas hot sticks have been developed specifically to give your line crews stronger, electrically safer, less expensive* tools.

*Epoxiglas tools are slightly higher in price than wood tools, but they require so little maintenance, and last so much longer, that you are dollars ahead in a short time.

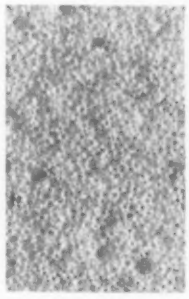
UNICELLULAR CORE STOPS MOISTURE IN ITS TRACKS

There's no place for moisture to go in Chance Epoxiglas hot sticks. It cannot penetrate the Epoxiglas, and condensation can't occur within the core. Why? Because the core consists of millions of unconnected, individual cells filled with inert gas. Moisture can't get from one cell to another . . . can't even form in a single cell unless that cell is broken.

FOR THE PROOF, SEE NEXT PAGE . . .

NEW CHANCE EPOXIGLAS HOT STICKS ARE MOISTURE-PROOF

Weather-ometer in the Chance Plastics Laboratories



THOROUGH TESTS IN THE WEATHER-OMETER show that Epoxiglas is virtually moisture-proof. Sticks exposed to extensive sunlight and 100% humidity show no deterioration or moisture absorption. A microphoto of the core (right) shows its unicellular construction. Because each cell is a unit with no connection to its neighboring cells, moisture paths cannot develop within the tube. Gas pressure within individual cells prevents moisture condensation.

Epoxiglas sticks have been exposed to a continuous spray of water for over a year and neither the surface nor core of the sticks absorbed any moisture.

Epoxiglas is unaffected by temperature, and it is highly resistant to sun, fungi, and other natural deteriorating agents.

You can use this hot stick tester to field-test your present tools. Contact your Chance representative for detailed information.

TESTING STICKS FOR ELECTRICAL PROPERTIES is part of the strict control exercised over Epoxiglas poles in production. As it is made, every inch of Epoxiglas pole is tested electronically with a production-line version of the Chance hot stick tester. These tests prove an Epoxiglas stick has an insulating quality superior to that of the air in which it will be used. Additional tests show that Epoxiglas poles which have been exposed to moisture, even for long periods, test completely safe (inset left) when wiped with a dry cloth. Compare this with tests made on wood poles that have been subjected to the same moisture conditions (inset right).

All Chance hand tools, wire tongs, and link sticks are now available in Epoxiglas. All are fitted with lightweight aluminum castings that make hot stick work easier and safer. Epoxiglas sticks are easy to order, too; just change the Chance catalog prefix letter from "M" to "H" when you order. You'll get the best *and safest* hot line tools ever made. Tools that are virtually moisture-proof; have extremely low electrical leakage; are consistently stronger than wood; are as light or lighter than wood; have great flexing strength; have greater tensile strength than wood sticks; are practically maintenance-free; and are immune to solvents and natural deteriorating agents.

Want more information? Contact your Chance representative. Get the whole story . . . then give the man on the pole a CHANCE for Safety.

A. B. CHANCE COMPANY

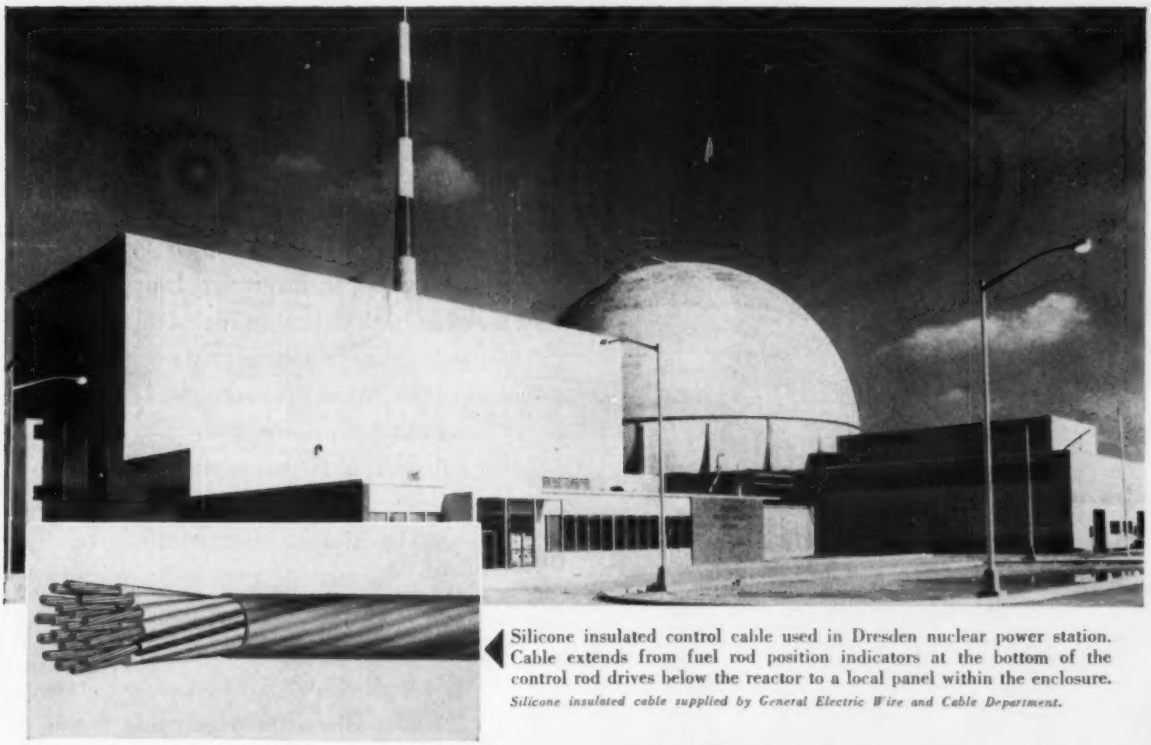
GENERAL OFFICES: CENTRALIA, MO.
A. B. CHANCE CO., Ltd. of Canada

ABC INDUSTRIES

CT60-1

General Electric Silicone Rubber Insulation chosen for Dresden Nuclear Power Station

Excellent moisture and heat resistance, protection against gamma radiation



Silicone insulated control cable used in Dresden nuclear power station. Cable extends from fuel rod position indicators at the bottom of the control rod drives below the reactor to a local panel within the enclosure.

Silicone insulated cable supplied by General Electric Wire and Cable Department.

Because it combines many desirable properties, particularly a combination of heat and radiation resistance, General Electric silicone rubber insulation is being specified for control and power cable in atomic reactors and other nuclear power generation equipment.

G-E silicone rubber also provides a more reliable and efficient cable insulation for many other electric utility and industrial applications. Among its many advantages are the following:

Excellent Heat Resistance: In power cable applications, offers long service life at temperatures up to 150°C; overload temperatures to 225°C; short-circuit overload temperatures even higher.

Extra Current-Carrying Capacity: As a result of its excellent heat resistance, cable insulated with G-E silicone rubber can carry up to twice the current as can conventional cable of the same size.

Low Moisture Absorption: Easily withstands moist operating conditions that may cause other insulations to fail.

High Ozone Resistance: Ozone and corona, which cause rapid aging of organic rubber, have negligible effect on silicone rubber.

Low Temperature Flexibility: Class 900 electrical grade G-E silicone rubber stays flexible at temperatures down to −60°C, special grades to −100°C.

Radiation Resistance: G-E silicone rubber insulation will withstand gamma radiation up to 1×10^8 roentgens, about 20 times higher than fluorine-containing insulation.

For more facts and figures on G-E silicone rubber insulation, write General Electric Company, Silicone Products Department, Section **FF413,** Waterford, New York.

GENERAL ELECTRIC

SILICONE PRODUCTS DEPARTMENT

Section FF413, Silicone Products Department
General Electric Company, Waterford, New York

Please send me further data on silicone rubber cable insulation.

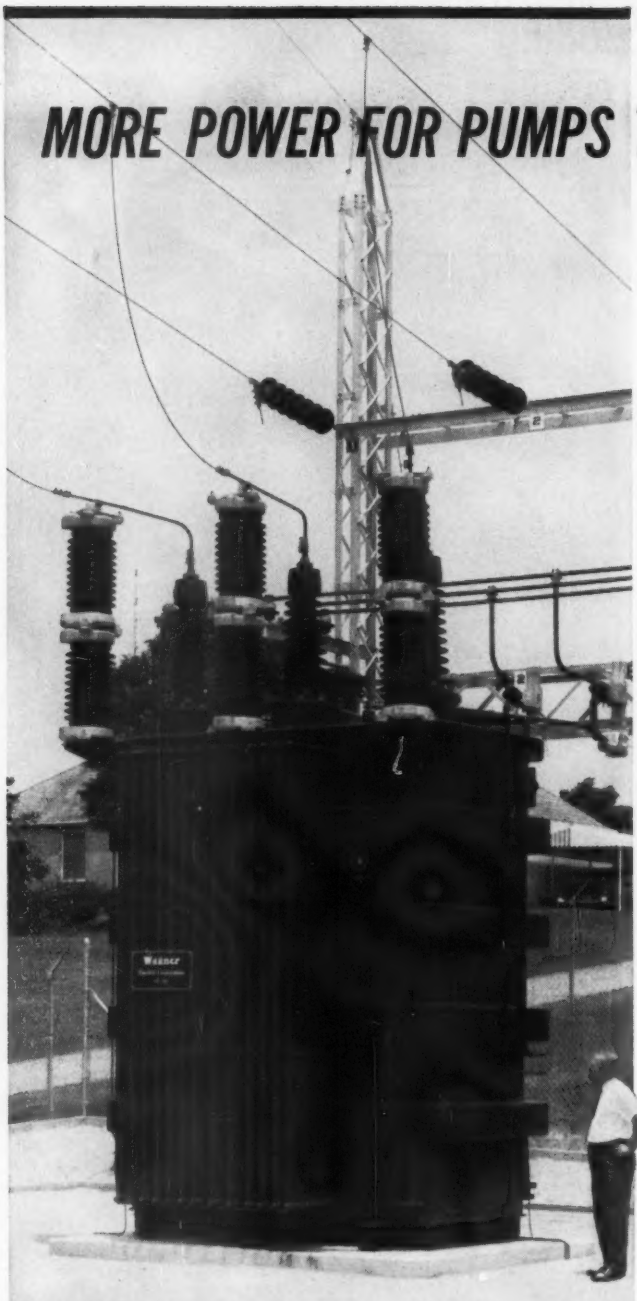
Name_____ **Title**_____

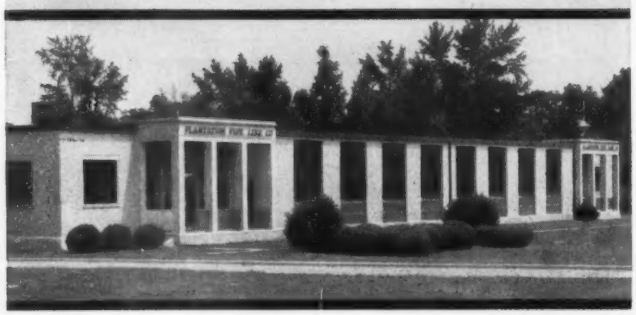
Company_____

Address_____

City_____ **Zone**_____ **State**_____

MORE POWER FOR PUMPS THAT PUSH PETROLEUM





THIS WAGNER TRANSFORMER

POWERS-UP

PLANTATION PIPELINE

The Plantation Pipeline Company pumping station at Neese, Georgia, is part of an underground transportation system that pushes high quantities of petroleum products to their market.

The Neese operation was originally served with power from a 44 kv system substation. However, the size of the pumping load—which includes some 1800 hp motors—became too great for the substation to handle adequately.

To better serve the load, Georgia Power Company recently installed a 110 kv line and built a new substation. Wagner Electric Corporation furnished the transformer rated at 7500 Kva for this purpose. Today, Plantation Pipeline pumps with full power.

Now, what about your power needs? If they present a critical (or even a potential problem), call your nearby Wagner Sales Engineer. He'll help you plan your power program . . . suggest Wagner transformers that will meet your needs for years to come. There are Wagner branches in 32 principal cities.

Wagner Electric Corporation

6456 PLYMOUTH AVENUE,
ST. LOUIS 33, MISSOURI

WT60-8

SERVING 2 GREAT GROWTH INDUSTRIES—*ELECTRICAL • AUTOMOTIVE*

this "new" transmission line design is taking the country!

In the first year since announcement of the Lapp Line Post with integral-gain-base for horizontal mounting, we've made shipments of this new unit on orders received from utility companies in nearly all parts of the country.

Why this sudden enthusiasm for a "new" insulator design? Well, *economy* for one thing. Elimination of crossarms, braces and hardware saves up to one-third in materials—and more in labor of erection. Then, because the insulator is stronger than the cross-arm construction, its use permits longer spans and/or larger conductors. Requires narrowest right-of-way. Easiest-ever for hot-line maintenance.

Then there's the better electrical performance of such a line. Horizontally-mounted, the Line Post has about 15% more wet flashover than it has in the upright position. Eliminates contamination flashover and pole-top burning.

Finally, this line makes for good public relations. Trim, unobtrusive, your 69 kv line through urban and suburban residential areas will have the "small" look of a distribution line. Permanently radio-free, too.

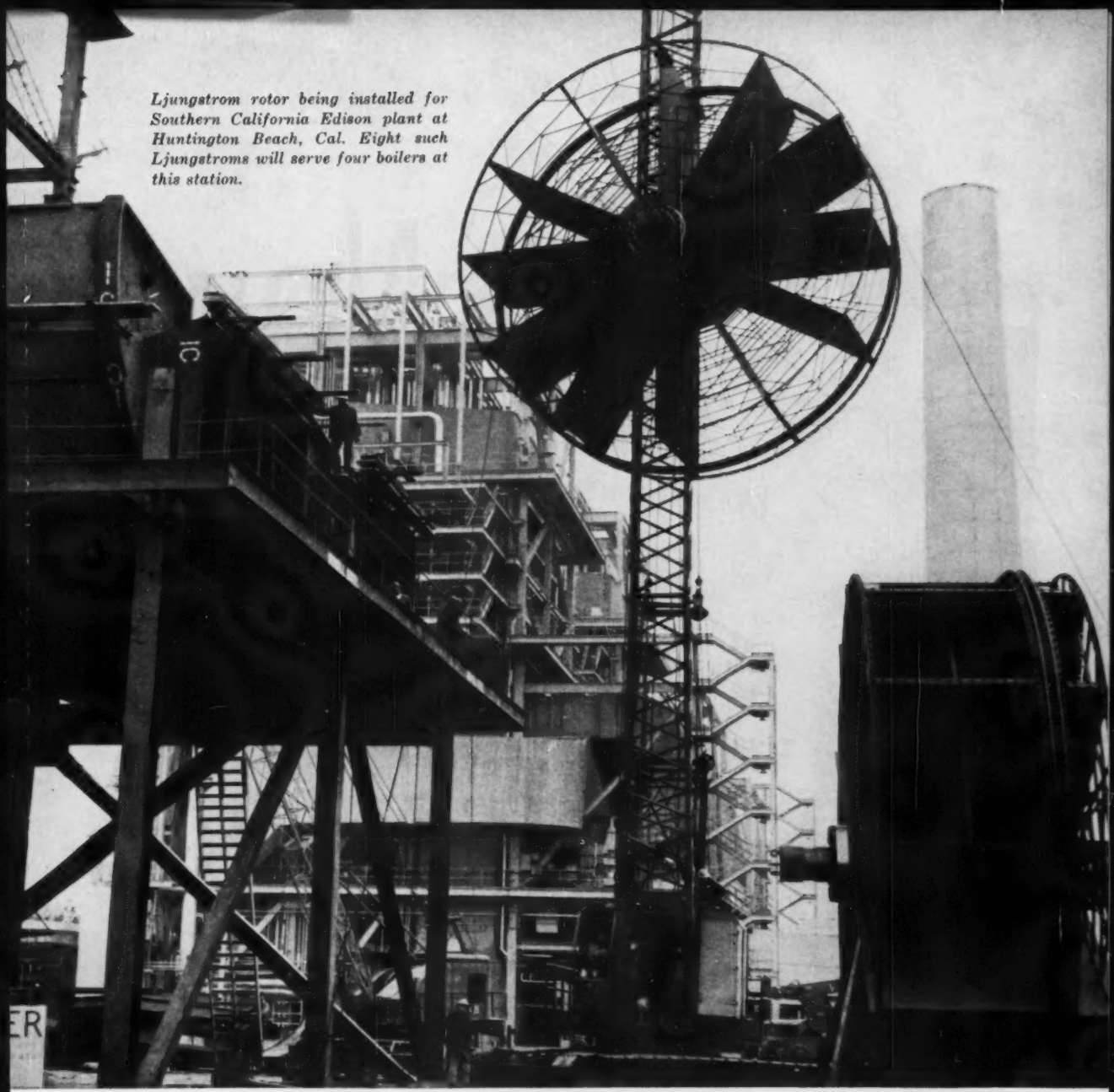
And after all, only the integral-gain-base is new. Lapp Line Posts even without this important improvement have been proving all these advantages of armless construction since 1936.

Lapp

Modern armless construction for sub-transmission and distribution is explained in detail in pages 24-27 of the New Lapp Catalog No. 8. Write for your copy.

Lapp Insulator Co., Inc., LeRoy, N. Y.

new! always RIGHT FOR ANY BI-METAL OR Al TO Al CONNECTION
WEAVER
PARALLEL GROOVE CLAMPS
ni-cad* COATED!
The weatherproof NICAD coating (over a hi-strength aluminum body) keeps any bi-metal connection troublefree, come what may: Heat, cold, salt, alkali, you name it!
They eliminate trouble caused by... (1) Oxidation of Cu against Al; (2) Unequal expansion or contraction of lines and clamps during severe temperature changes. Contacts stay tight—no arcs.
NO SEPARATE INSERTS TO CATCH MOISTURE AND CAUSE CORROSION! NO SOLDERED JOINTS!
Permanent Low-Resistance Connections
WRITE FOR SAMPLES FOR TESTING
Five sizes now available (NI-CAD coated or non-coated) to cover all requirements.
*Extremely heavy coating of cadmium and other corrosion resistant elements
2110 HOWARD ST. • ST. LOUIS 6, MO. • GArfield 1-6336
J. A. WEAVER Company



Ljungstrom rotor being installed for Southern California Edison plant at Huntington Beach, Cal. Eight such Ljungstroms will serve four boilers at this station.

AIR PREHEATER SERVICE WILL STILL BE IN EFFECT ON THESE UNITS IN THE YEAR 2000

These new Ljungstrom® Air Preheaters, being installed at Southern California Edison's Huntington Beach Station, will be protected by an unusual service policy, one that guarantees regular inspection by Air Preheater engineers throughout the life of each unit.

There's no terminal date on this service — it's in effect as long as the units are in operation. In fact, Lifetime Air Preheater Service is still helping to keep the first Ljungstrom installation in the U.S. running perfectly, although it's been in operation almost 40 years.

Air Preheater provides first-rate *factory* service too, In one instance, in response to a last-minute decision to replace cold-end elements near the end of a scheduled shutdown, Air Preheater *fabricated and shipped* over 13,000 pounds of heating elements the day after the order was received.

Regular inspection and fast factory service are just two of the advantages Air Preheater offers its customers. Another is expert knowledge of boiler and preheater problems, gained through 35 years' experience. This combination—knowledge of customer problems and a *continuing* interest in them — probably explains why nine out of ten preheaters sold today are Ljungstroms.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

New...

100-KVAR CAPACITOR

...doubles capacity in pole-top installations

Westinghouse Electric Corporation's more than two years of pioneering experience in 100-kvar capacitor development have paid off in a unit which is 28% lighter. Over-all volume has been cut by 25%—1000 cubic inches!

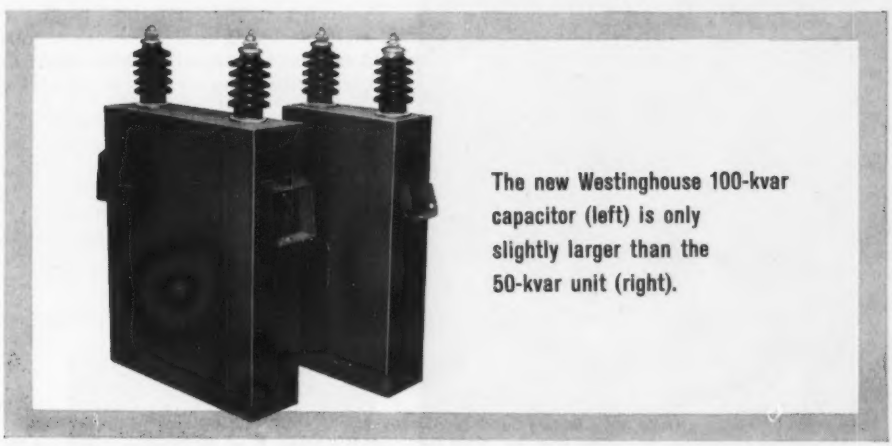
As an example of the economies resulting from this product of Westinghouse research and development, a 1200-kvar Autotrol* with 100-kvar capacitors now occupies no more pole space than a 600-kvar Autotrol with 50-kvar units. Size and weight reductions like these promise proportionate advantages not only in complete Autotrols, but also in stack-type equipments, and mean greater efficiencies and dollar savings for you.

Let us show you how these savings can apply to your system. Call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

*Trade-Mark J-60995

YOU CAN BE SURE...IF IT'S

Westinghouse



The new Westinghouse 100-kvar capacitor (left) is only slightly larger than the 50-kvar unit (right).

Distribution cost per customer greatly reduced by EBASCO planning

Wherever Utility Companies have called on Ebasco engineers for help in planning expansion of transmission-distribution systems . . . costs have been reduced, efficiency materially increased.

How does *your* system look in terms of present needs? Of future expansion?

Ebasco offers you long-range *or* interim planning services based on over 50 years' experience in finding economical solutions to the problems of the electric utility industry. Ebasco analyzes your present system minutely: from markets, to load growth, to future requirements. Ebasco engineers make their recommendations —based on practical world-wide experience— as to project locations, rights-of-way, land acquisition. Their thorough knowledge of methods, equipment, capacities provides invaluable assistance in comparing investment and operating costs.

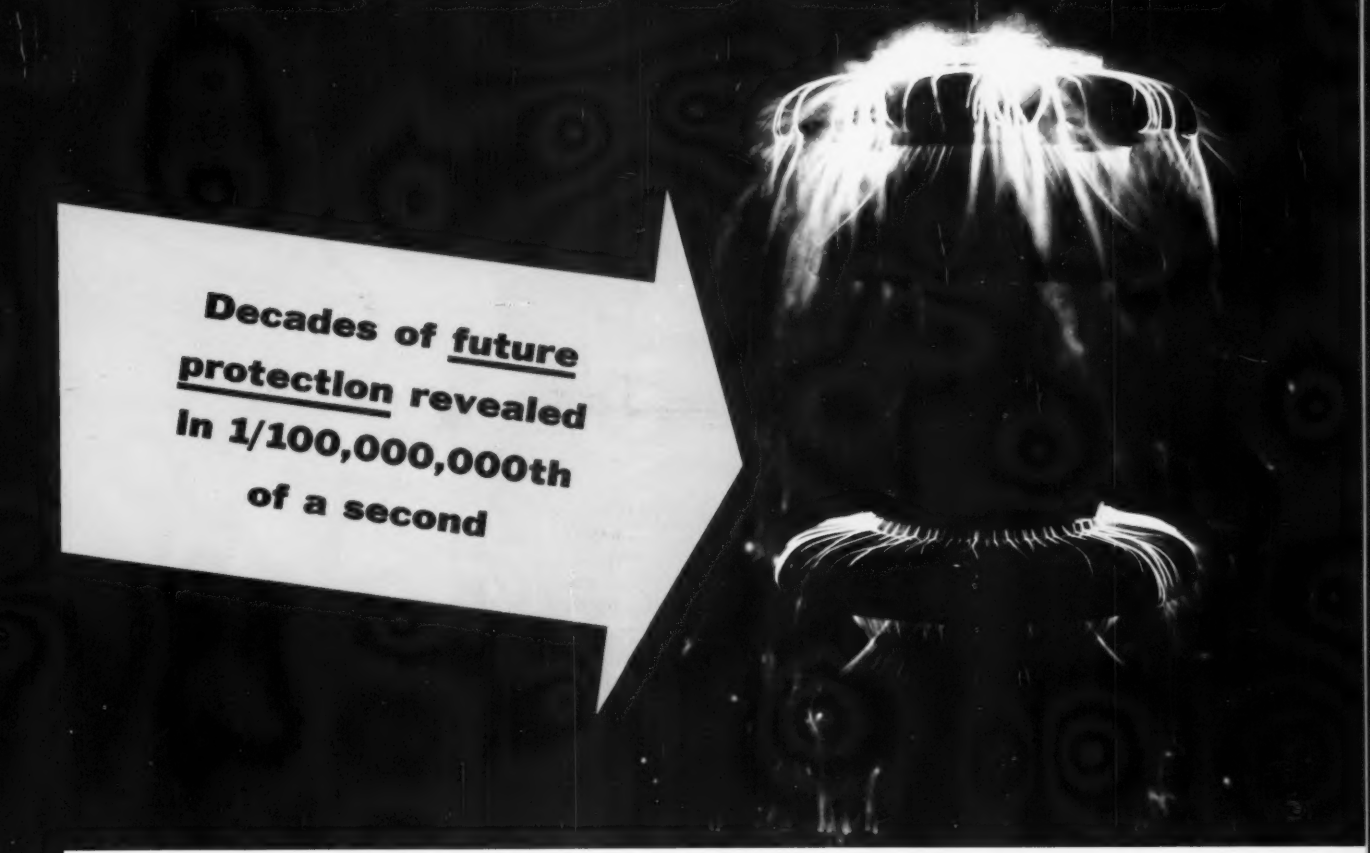
Consider *your* distribution needs . . . improvement program, new installation, partial or complete construction? You avoid delays, errors, costly indecision when you call on Ebasco.

Our brochures describe Ebasco's services and how they may be of use to you. For copies, write Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

ENGINEERS · CONSTRUCTORS
EBASCO
MANAGEMENT CONSULTANTS

NEW YORK
CHICAGO
DALLAS
PORTLAND, ORE.
SAN FRANCISCO
WASHINGTON, D. C.

"One kind is better..."



A strange-looking phenomenon - - even to most insulator manufacturers!

Unconventional, and highly uncommon laboratory techniques permit study of O-B switch insulator stacks under critical pre-flashover electrical stress. The condition illustrated exists one hundred-millionth of a second before lightning flashover - - that tiny morsel of time in which insulators live or die.

Studies such as this permit us to evaluate the intricate behavior of insulators. It permits us to say in all honesty, "One insulator is better than another." And the reasons why are clearly shown.

When you purchase switchgear or "packaged" substations on the open market, you have free choice of insulators. Isn't it wise to protect the future by taking just a minute to write "O-B insulation" on these orders? Name it, and you can have it!

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass (B) HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4921-H4

All sources of bushing

strength combined

Result... modern O-B condenser bushings are the strongest we have yet made, after 50 years of satisfactory performance

For nearly 50 years, O-B bushings have proved their strength in rigorous circuit breaker service -- have proved to be of superior strength, in fact.

Conversion to oil-and-paper condenser design within the last few years posed the problem of retaining this superior strength in a much more slender mechanical structure. A new approach was required, and O-B's exceptional core construction supplied the answer.

Tightly compacted under tons of winding pressure, the laminated paper core is "hard and stiff as an oak log." Strength of this massive backbone is exploited by establishing numerous contact points between core and housings, permitting them to work together as a unit, combining their strengths, and ending-up with the strongest bushing we have yet produced.

This is one of scores of ingenious innovations in design you get in modern O-B condenser bushings -- all pointed at maximum dependability.

It is no more difficult to put this dependability to work on your own system than to write "O-B bushings" on your orders for new circuit breakers or transformers.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

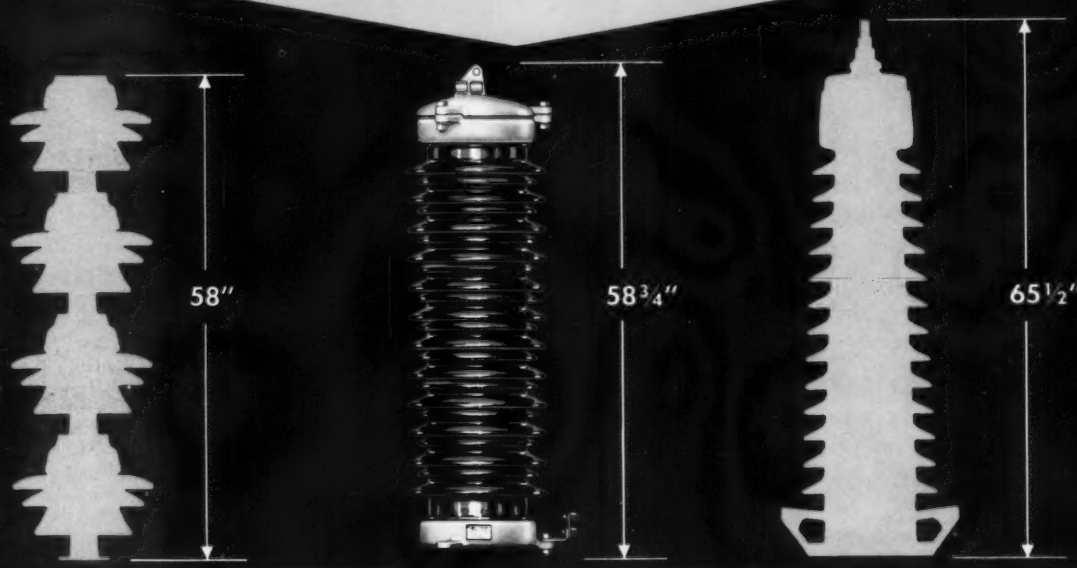
HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4921-H23

THOREX® fits anywhere...

Compact Thorex arresters offer a host of opportunities to save trouble and money



Here's food for thought. Look at these dimensions for a Thorex Dynagap Type MPR lightning arrester, an insulator stack, and the upper projection of a bushing, all for 138-kv service. The arrester is about the same size as a bushing or a station insulator.

Think of where you can put these Thorex arresters! Mount them directly on the transformer cover, save the cost of brackets and avoid interference with radiators. Put the arresters right inside station steelwork, anywhere an insulator stack will fit. With Thorex working for you, arresters are no longer a problem of space, special structures, or added costs.

And, for all this convenience and economy, you get single-housing immunity from the effects of contamination, unsurpassed surge durability, maximum protection in every category. This is why Thorex arresters are the unquestioned choice of so many systems today.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

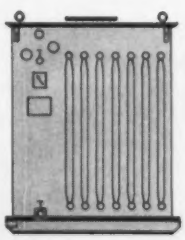
4921-H1

NEW BULLETIN

contains all data you need for planning power-center sub-stations

Designed with busy engineers and architects in mind . . . permits you to work out your own electrical design layout

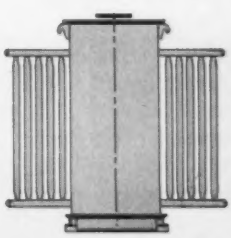
Complete engineering data shows you how to use Uptegraff's standard basic load center transformers in combination with your choice of terminal variations such as throats, junction boxes, cover bushings, etc. Standardization of all units saves layout time, speeds deliveries, enables users to have exactly what they want at lowest cost.



Front View

Data in bulletin describes

basic unit and various standard transformer arrangements planned for use with switchgear and other equipment. It includes drawings, ratings, dimensions, weights, performance and other information necessary for planning power-center sub-stations. Send for free copy.



End View

R. E. UPTEGRAFF
MANUFACTURING COMPANY
Scottdale, Pennsylvania

Mail this coupon for your free copy

R. E. UPTEGRAFF MANUFACTURING CO.
Scottdale, Pennsylvania

Gentlemen: Please send Load Center Transformer Bulletin 132-B to:

Name_____

Address_____

City_____ State_____

Paramount, California, uses new General Electric Power Groove Lamps and gets

"4 TIMES BRIGHTER STREETS... 4% LOWER OPERATING COSTS"

says City Manager Dwight L. Hulse

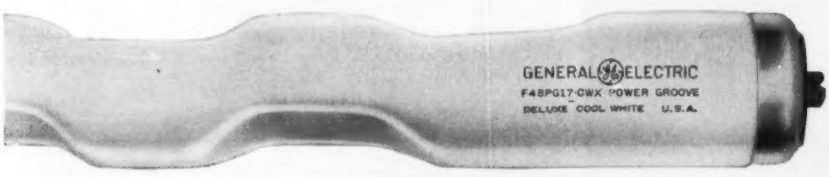
Here's how Mr. Hulse explains it. "Until recently we used a filament lamp street lighting system that was less than ten years old and delivered .4 of a footcandle of light. And while this is more light than you find on many thoroughfares, it became apparent about two years ago that we needed more. So we modernized, our street lighting, using new General Electric Power Groove® Lamps.

"The result? Over 4 times as much light and a 4% lower electric bill! And we've had *no lamp failures in almost a year!*"

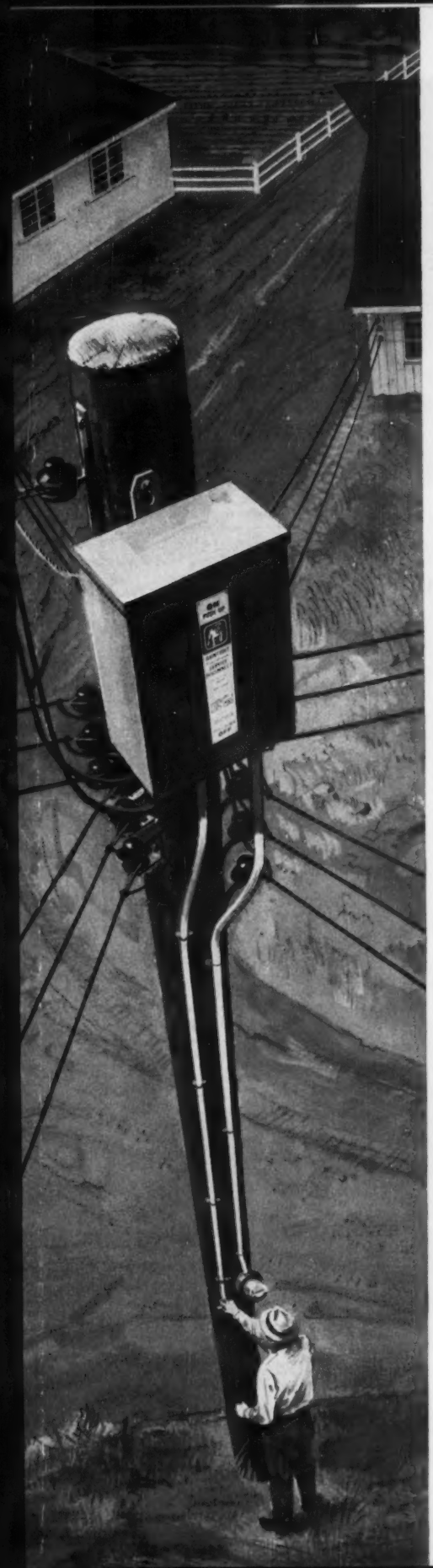
General Electric Power Groove Lamps are ideal for high traffic areas—especially where more than 1 footcandle of light is sought. For one thing, comparing new installations, you have about ⅓ fewer lamps to replace compared to high output lamps—the next most powerful fluorescent type. And they give more light per dollar, bringing the most modern lighting within reach of any community. For more information on how General Electric Power Groove Lamps can cut *your* street lighting costs, write: General Electric Co., Large Lamp Dept. C-019, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC



General Electric... where bright ideas become better lamps



NEW POLE-TOP SERVICE DISCONNECT

Cuts long, costly conduit-and-cable runs

This new Pole-Top service disconnect provides maximum electrical control at minimum cost . . . does away with expense of long cable and heavy conduit runs necessary with ordinary ground-level switches.

You operate it *easy, fast,* because the long control rod brings the handle down to *any* convenient operating level . . . while the Pole-Top disconnect stays safely at the pole-top. The handle padlocks "On" or "Off"—tamper-proof, convenient, safe.

Gives on-the-spot electrical control for farm safety

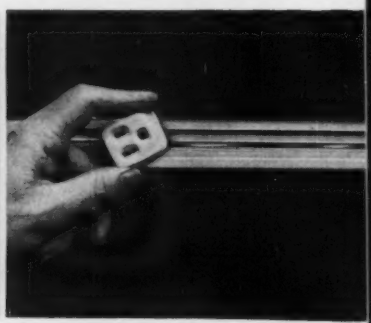
You have instant electrical control of *all* your buildings with Pole-Top. And it's up *high,* safeguarding children and livestock against accidental contact.

Pole-Top is rain-tight, weatherproof. UL listed as service equipment. Designed to take metering transformer inside the switchbox.

OTHER BULLDOG ELECTRICAL PRODUCTS FOR THE FARM

Vacu-Break® Safety Switches

Pushmatic Electri-Centers®



2-Wire and 3-Wire Electrostrip® (Patented)

For information write: BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

INTRODUCING . . .

PMT

THE PAD-MOUNTED TRANSFORMER
ONE CABINET SIZE FOR ALL

Check These Exclusive PMT Features:

3 Choice Sectionalizing Load Break Switch . . . Isolates trouble without dropping the primary feed. This means less outage time during transformer change-outs or faulted cable isolation. Three settings permit loop feeder service or service from 1 of 2 sources. See explanation below showing how the sectionalizing switch works.

Quick Change-Outs . . . Compartment design further simplifies change-outs. Uprating through 100 KVA is a matter of loosening four clips and replacing the transformer unit with a higher KVA rating. The same cable compartment serves all ratings.

Low Loss, Long Life Transformer Unit . . . The PMT Transformer unit includes the famous low-loss "Bent Iron" core and "Long Life" Kuhlman coil. It offers the same low exciting current—low copper and core loss—low impedance—better regulation and operating economy designed into all Kuhlman transformers.

Get all the facts about new Kuhlman PMT. Write for PMT bulletin, CS-205.

Advertising Department
Kuhlman Electric Company
P.O. Box 288
Birmingham, Michigan

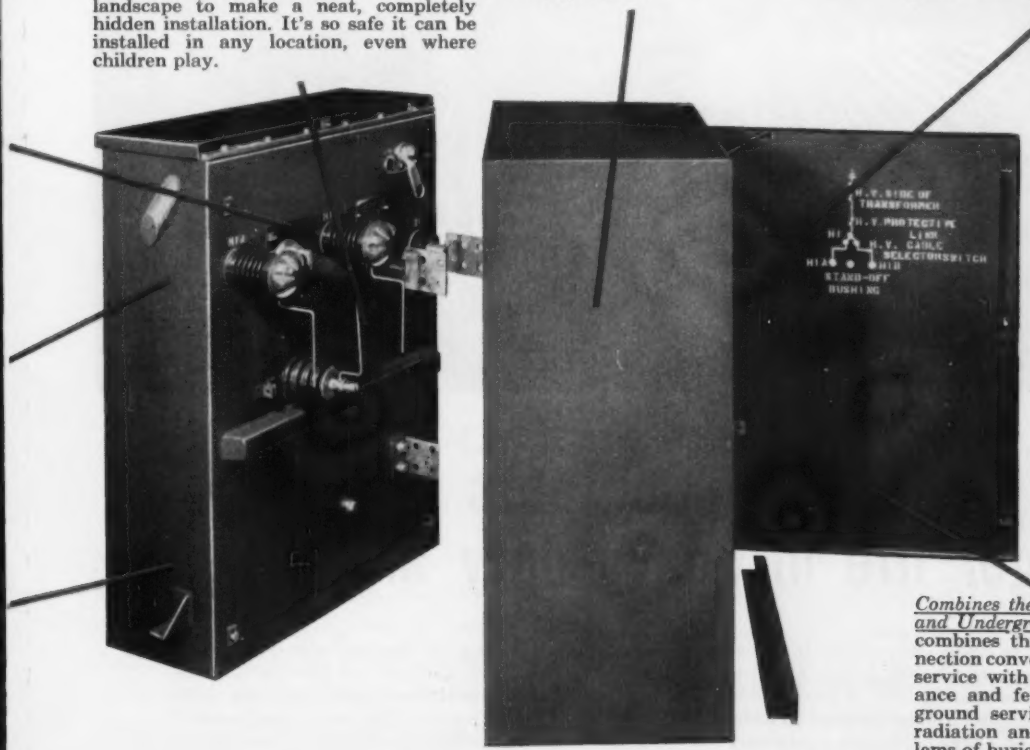
Economical, flexible, compact Kuhlman PMT meets all the special needs of underground distribution. It is easy to landscape—easy to change-out. It operates at full load capacity and is completely safe.

WITH A SECTIONALIZING SWITCH AND RATINGS THROUGH 100 KVA

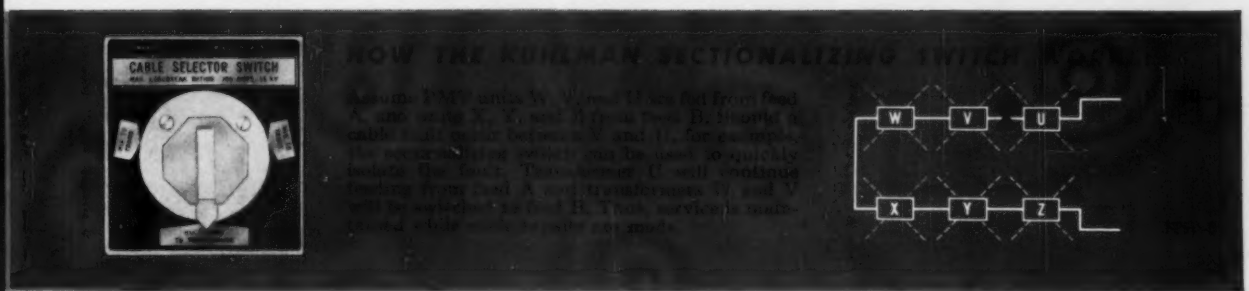
Serves In Any Location . . . High and low voltage bushings are separated by insulation barriers. An insulating panel (not shown below) closes off the high voltage section protecting personnel from accidental contact with the high voltage. PMT readily blends into the surrounding landscape to make a neat, completely hidden installation. It's so safe it can be installed in any location, even where children play.

Compact and Convenient . . . Transformer terminals, incoming cables and protective equipment are easily accessible and conveniently located in a self-contained enclosure. Ample space is provided without sacrificing compactness.

Operates at Full Nameplate Capacity . . . PMT does not have to be derated. Mounted above ground, it takes full advantage of Kuhlman's generous oil circulation to assure cooler operation, longer life and greater short-time overload capacity.



Combines the Best in Above Ground and Underground Service . . . PMT combines the change-out and connection convenience of above ground service with the improved appearance and fewer outages of underground service. It eliminates heat radiation and air circulation problems of buried or semi-buried transformers.



KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Mich. **Factories at Bay City, Mich.; Crystal Springs, Miss.; Salinas, Calif.**

Specify ELKONITE® Contacts for longer life in heavy-duty air breakers

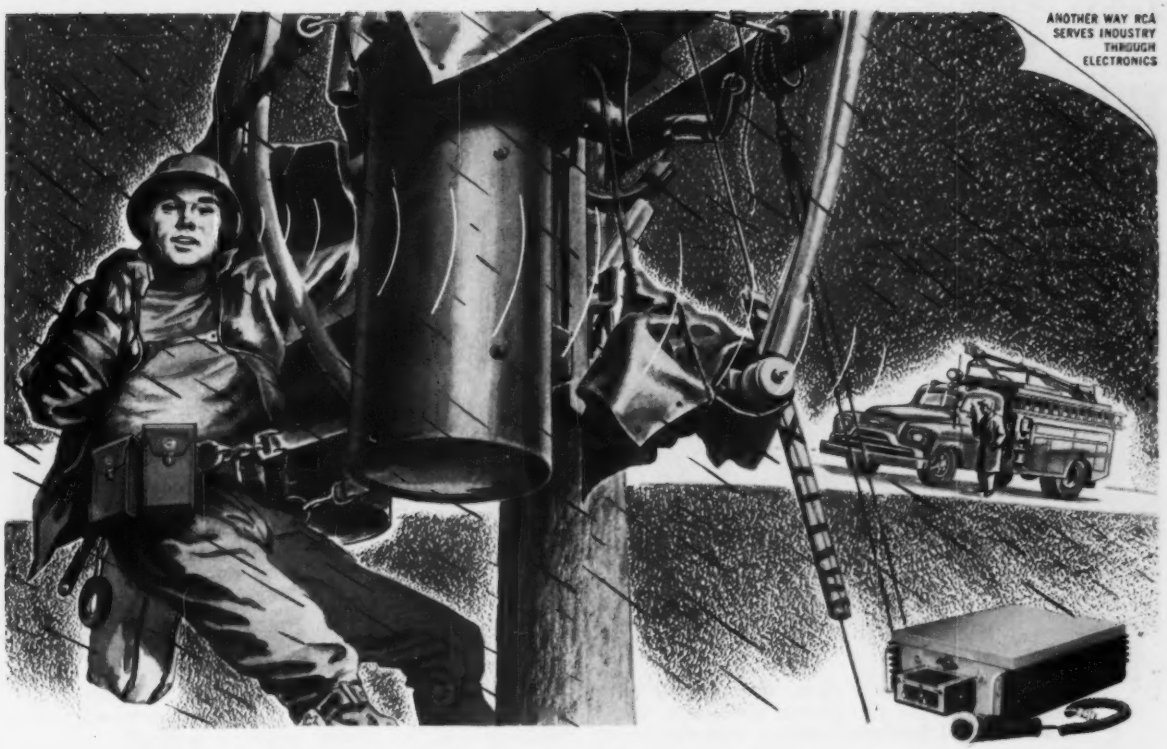
Top performance in heavy-duty air circuit breakers depends on contact reliability. Contacts must be able to stand the searing heat of heavy arcing and the sledgehammer blows of breaker reclosing. You can depend on rugged Elkonite contacts for this demanding service because they're engineered to exact performance requirements. Specifying Elkonite contacts for your circuit breakers will pay off in dependability . . . and much longer life.

Utilizing Mallory's specialized powder metallurgy techniques and contact know-how, Elkonite combines heat-resistant refractory materials with high-conductivity metals. Elkonites are part of the broad line of Mallory contact materials covering the entire range of conductivity, mechanical strength, hardness, density and arc erosion resistance. Precisely controlled manufacturing processes—refractory particle size, methods of pressing and sintering—produce the optimum combination of characteristics for each contact application.

Leading manufacturers of circuit breakers, load tap changers, power switches and other products know that Elkonite means long service and unequalled performance. Make sure you get these important qualities—*insist* that your supplier use Elkonite contacts in the apparatus you buy.

From generator to user,
Mallory contacts serve the nation's utilities . . .

Mallory Metallurgical Co., Indianapolis 6, Ind.
a division of
P.R. MALLORY & CO. Inc.
MALLORY



New Communications Convenience and Control for Utilities...

RCA Mobile "LD" Radio with PERSONALFONE!

Here's the way to gain top efficiency in handling your trucks and your men: use dependable RCA 2-Way "LD" Transistorized Radio in mobile equipment, and RCA Personalfone "Belt" Radio on linemen or construction workers away from vehicles . . . for instant contact on the job!

RCA "LD" (Low battery Drain) Radio assures quality that only the leader in radio and electronics can offer. Standard transistors are used in circuits where long experience proves their reliability, and you get maximum on-air time because circuits are "Road Map" coded for fast, sure servicing guidance. You'll like the "LD's" clear spoken voice, too, thanks to a powerful five watts of audio. Feature for feature, dollar for dollar, the LD is "today's best buy in 2-way radio."

New RCA Personalfone miniature "Belt" Radios provide personalized two-way communication extending your radio system to men on-the-go. Your crews are never out of touch with this versatile transistorized receiver and companion transmitter. Both miniature units mount in convenient belt pouches.

Find out about this modern communications equipment today! Lease and purchase plans available.

RCA's FIRST NAME IS RADIO

Your RCA Representative will be glad to discuss your specific communications requirements. Or for complete descriptive literature—write RCA, Dept. FC-45, Building 15-1, Camden, N. J.

RCA Tmk(s) ®

RADIO CORPORATION of AMERICA

COMMUNICATIONS DIVISION — CAMDEN, N. J.

Developed to meet your needs...

To satisfy the needs of meter departments who asked for a single transformer to handle loads now measured by 200:5, 400:5, and 600:5 (or 800:5) current transformers, Sangamo has developed this 300/600 amp dual range feature in the BH-6 Current Transformer. Now, the transformer changeouts your crews will have to make are greatly reduced.

This new 300/600 amp transformer has the same physical characteristics as the BH-6 Current Transformers already in wide use. Its body is made of molded epoxy resin, resistor color-coded a bright orange for instant identification. It has an oval shaped window for flexibility in application with the greatest usable opening of any 600 volt current transformer. It's compact . . . the smallest, lightest transformer in its class . . . and, it's easy to mount. It's pre-tested at the factory, and is shipped to you with a certificate of accuracy, ready to be put on the line.

Naturally, its two range feature reduces transformer stocks . . . eliminates need for customer interruption . . . permits "up-scale" demand measurement for better metering accuracy . . . allows initial installation of larger entrance cables . . . eliminates transformer changeouts. And, changing the range of this newest BH-6 transformer, like changing the range on the 200/400 and 400/800 amp BH-6 transformers, is as simple as 1-2-3. First, close the short circuiting link. Second, transfer the secondary lead from the 300 to the 600 amp terminal. Third, open the short circuiting link.

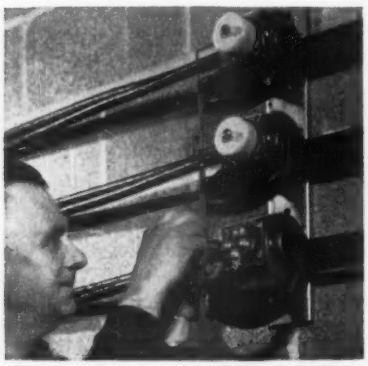
Your Sangamo Representative has complete information on the new BH-6 300/600 amp Current Transformer. Ask him for it . . . soon.

Now, check the pictures below. They show how the flexibility of the new BH-6 300/600 amp Current Transformer can serve you—and your customers—best.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

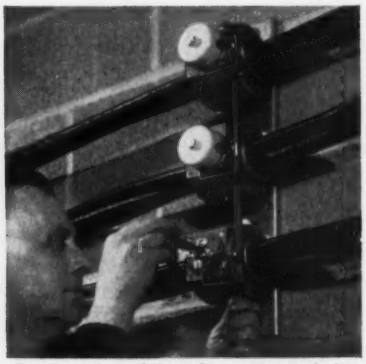
Lets you standardize on one transformer for all ranges from 15 through 1200 amps.

SM60-2



Two turns, transformer secondaries connected on 300 amp range. This results in a 150:5 transformer ratio with overload capabilities to 300 amperes.

Two turns, secondary wiring connected to 600 amp terminal. This results in transformer ratio of 300:5 with overload capabilities to 600 amperes.



One turn through transformer, secondaries connected in 600 amp position. This results in 600:5 transformer ratio with overload capabilities to 1200 amperes.

Editorial Comment

APRIL 18, 1960

Commercial Cooking: A Study in Potential

Whether the Fifties are considered "fabulous" or "frenetic," one thing is sure: In the commercial electric cooking area, they represent a decade of tremendous growth.

By 1950, commercial electric cooking load for the nation's utilities was just about a million kw. By the end of the decade, this had jumped to 9.5 million.

Back in the early years of the decade, an Electrical World survey of commercial cooking-conscious power utilities uncovered some 40 which were having a measure of success with this load. In our latest report (p 75-82), we found 72 utilities willing to report results which add up to the fact that commercial cooking is a wonderful load builder.

These utilities note that selling this load still is sometimes difficult. But once sold, it pays off richly in kwhr, EAR, and satisfied customers.

Moreover, despite sales resistance, commercial cooking usually can be considered a load well worth investigating, promoting, pushing, and selling, especially when considered in the framework of proportion of time and money spent.

It definitely is a load which can help commercial kwhr figures occupy a prominent spot in overall sales.

But anyone who relaxes and assumes the market is saturated will be making a big mistake. There's a long way to go: Only 10.8% of the nation's food service outlets are all-electric.

As we see it, heavy advertising, backed by boosted CC sales force, is needed in many areas to take full advantage of the opportunity to make the term "cooking with gas" a phrase of the past in the nation's commercial culinaries.

Keep Soviet Progress in Perspective

The returns are in on the first year's progress of the Soviets' widely publicized Seven Year Power Program (see p 71).

Apparently the Russians are just about on schedule, at least as far as installation of generating plant is concerned.

They freely acknowledge difficulties encountered in producing power plant equipment of size and parameters envisioned as necessary to meet overall goals. This simply means these goals will be technologically difficult of achievement, particularly in the later years of the program.

Now, more than ever, it is important to place the Soviet power expansion in proper perspective. We have cautioned before and will caution again that power "numbers games," comparing U. S. and Soviet expansion rates, are insidious and achieve no worthwhile purpose.

Fundamentally, the contest between the two nations is for the minds of men. The arena with which power men should be most concerned is that of economic competition. The Russians must expand power plant at a high rate to meet the artificially forced growth of their economy. The methods and the expansion patterns they choose increasingly reflect the growing importance they attach to *time* in distinction to economy.

Our power growth is in another stage entirely. We can afford and should continue to grow in economical fashion.

We shall continue to insist that these matters be kept in perspective.

Savings Reported From St. Lawrence

Rural and domestic customers of New York utilities are receiving millions cash savings, according to Robert Moses

After less than a year of full operation the St. Lawrence Power Project shows estimated annual savings to rural and domestic consumers of the low cost energy in excess of $4 million.

In making these figures public, Robert Moses, chairman of the N. Y. State Power Authority (PASNY), prophesied an even greater savings for rural and domestic consumers of Niagara Power. That project is slated to deliver first power next February.

Record breaking construction schedules were met on the St. Lawrence Project where the Robert Moses Power Dam is generating 700 Mw of firm hydroelectric power. At Niagara where the first of its 1.7 million kw of firm power will flow from the generators in February of 1961, three years after construction started, even faster schedules are being met.

The forecast for Niagara follows the U. S. Supreme Court's decision which will enable the Power Authority to increase the reservoir at Lewiston, adding at least 100,000 kw firm generation to the 1.7 million estimated before the favorable action of the court. Of this additional 100,000 kw, 50,000 kw of firm power will be added to the 200,000 kw previously allocated to industries of the region and an equal amount will be available to rural and domestic consumers.

In its contracts with public utilities and other distributors of St. Lawrence and Niagara hydro energy, the PASNY, pursuant to law, mandates that savings thus realized must be passed on to rural and domestic consumers.

Last year's power sales, according to PASNY, from the St. Lawrence Project resulted in $2,231,000 cash savings passed on to rural and domestic customers of the Niagara Mohawk Power Corp and New York State Electric & Gas Corp. Niagara Mohawk has a contract for 115,000 kw and NYSE&G for 20,000 kw. Niagara Mohawk customers received savings of $2,182,000 during 1959 and those of NYSE&G $49,000 during an eight-month period of that year.

In the case of the Public Service Commission of Vermont, which purchases 100,000 kw of St. Lawrence power, the savings were estimated at $1,272,000 a year. The precise figure will not be available until a complete accounting has been made.

Municipal and REA systems in New York are receiving benefits estimated at $543,000 annually, of which $372,000 will go as direct savings to the customers. The remaining $171,000 is earmarked for construction of new facilities and the establishment of reserves and working capital.

It was pointed out by Moses that the St. Lawrence Power Project, built in a hitherto sub-marginal industrial area, brought with it many benefits other than savings in power costs to small consumers.

In Massena alone, the Aluminum Co of America spent $25 million for modernization and expansion, while the Reynolds Metals Co and the Chevrolet Division of General Motors Corp constructed plants costing more than $100 million and providing hundreds of new jobs.

Tourism has attained the status of a major industry and the boom in hotel, motel, housing, and other construction, and the increase of new service businesses still continues with the new parks, beaches,

Western Europe Will

Next 15 years will see consumption of electricity nearly doubled in 18 countries making up the OEEC organization

Paris (*McGraw-Hill World News*)—Fifteen lush years lie ahead for utility men in Western Europe if power consumption forecasts published this month by the Organization for European Economic Cooperation holdup.

Short-range consumption forecasts supplied by the 18 member countries for the OEEC Electricity Committee's 10th Annual Report indicate a yearly rise of 6.5%, on the average, until 1964. With no signs of saturation in sight, the Committee's experts predict that consumption will hit 700 billion kwhr in 1965 and move on up to the 1300 billion kwhr mark by 1975 (see table). Expected trend in production during this period is a gradual drop in the proportion of demand met by hydro plant as economic sites are exhausted. Only toward the end of the 1960-75 period, the Committee thinks, will nuclear plant begin to make "some contribution."

The bright future forecast for Western Europe's power industry follows a period in which the rise in electricity consumption, 130% for the 1948-58 decade, far outstripped the 43% across-the-board rise in energy consumption. For 1958, production in the OEEC countries totalled 450 billion kwhr, 180 hydro and 270 thermal. The thermal total alone accounted for the equivalent of 140 million tons of coal, roughly a fifth of the area's available supplies for the year of coal, brown coal, oil products and natural gas.

Heavy investments in power plants, transmission lines and distribution networks accompanied the sharp rise in consumption. In 1958 alone, new investment was $3,600 million, more than two-thirds the total capital investment for the energy sector as a whole and about a tenth of the total investment for all industry in Western Europe.

The steep climb in the power consumption curves has been matched by technical advances that

Power Sales

marinas, and other recreational facilities built by the Power Authority as related improvements continuing to draw increasingly large numbers of tourists.

"The St. Lawrence Power Project has had a substantial beneficial economic impact on the St. Lawrence Valley, and for that matter on the entire State of New York," said Moses.

These savings will continue over the years and will be added to upon completion of the Niagara Project, and the transmission tie line which will raise the level of firm power at both of the Authority's plants.

Last September the PASNY allocated 200,000 kw of firm Niagara power for industrial expansion in the area over and above the 445,000 kv earmarked by Congress for those industries receiving low cost power prior to the partial destruction by a rock slide of the Schoellkopf power plant of Niagara Mohawk. Requests had been made for 355,000 kw. These industries presently obtain their power at a much higher rate from Canada.

Investment by industry in new facilities will aggregate about $170 million.

With the added 100,000 kw made possible by the Supreme Court's decision, the Power Authority can provide additional power for further industrial expansion. This will mean further investment in new facilities and more permanent jobs.

ROBERT MOSES DAM and power house is turning out kilowatts for growth

Grow; Forecast Is Made in Kilowatts

the Committee describes as "spectacular." Average power plant efficiency went up from just over 20% in 1950 to 26% in 1958, should be around 30% in 1964. The improvement has come chiefly from a shift to larger and larger generator sets. Ten years ago, the bulk of alternators in service were 50—60 Mw sets; by 1958, 100 Mw sets began to predominate. By 1962, the Committee points out, over three-quarters of new plant will be getting even larger sets.

Another important development in recent years has been the gradual phasing out of merchant-grade coal in thermal plant in Western Europe. Fuel oil and cheaper fuels —low-grade coal, brown coal, and more recently, natural gas—have moved in and, along with the increased thermal efficiency, have brought lower power rates in most countries where thermal plant dominates. In countries where hydro plant contributes heavily toward meeting demand, the situation, to quote the Committee, "is not so favorable," the best sites are already harnessed and cost of new dams continues to soar in nearly all the countries of Western Europe.

Outlook for nuclear power in Western Europe is hazy. The Committee pegs possible production by nuclear plants at 2 billion kwhr for 1960, 30 billion kwhr for 1965 and anywhere from 90 to 210 billion kwhr for 1975, but adds that no forecast can yet be made.

The Committee tops off its report with some suggestions on how the long-term demand can be met. The important points—

- Base plant investments on long-term demand and thereby eliminate the unhappy effect of short-term fluctuations on constructors and equipment manufacturers.
- Exploit hydro sites, especially to get peak load coverage, in those countries where economic sites still remain untapped.
- Step-up international power exchanges between interconnected countries to prevent "spilling" hydro energy and to cover needs of countries during poor hydro years.
- Improve plant utilization, now averaging 3,700 hours per year in Western Europe, by rate structures that encourage off-peak consumption.

OEEC Forecast for Electricity Production in Member Countries

(Billions of Kwhr)

	1960	1965	1975	
Conventional thermal	315	410	800	680
Nuclear	2	30	90*	210**
Hydro	200	260	410	410
Total production	517	700	1300	1300

* Estimate for minimum nuclear development
** Estimate for maximum nuclear development

Baldwin-Lima-Hamilton Bid Okayed

Settlement of the Baldwin-Lima-Hamilton vs English Electric controversy should end USBR delay on acceptance of bid

Comptroller General Joseph Campbell has ruled that Baldwin-Lima-Hamilton Corp is the legitimate low bidder for installing eight turbines at Glen Canyon Dam.

Campbell turned down the appeal of English Electric Ltd seeking the bid after weeks of study by the General Accounting Office. Campbell said that Baldwin-Lima's $6,392,000 bid should be accepted by the Bureau of Reclamation, which is in charge of the Upper Colorado Water Storage Project of which Glen Canyon Dam is a part.

The case involved whether B-L-H could qualify as a "domestic" firm in bidding on the Glen Canyon turbines. Domestic firms—under the Buy American Act—get a price advantage (normally 6%) in competition with foreign concerns, even larger advantages (usually 12%) if the domestic firm is located in a "labor distress" area.

To qualify as domestic, however, a firm must prove that it will perform or supply at least 51% of its work in the U.S. It was on this issue that English Electric appealed. The British firm protested that B-L-H had not qualified because it failed to follow specific instructions in a Form (7-1480) used by the Bureau of Reclamation to determine the percentages of foreign and domestic work.

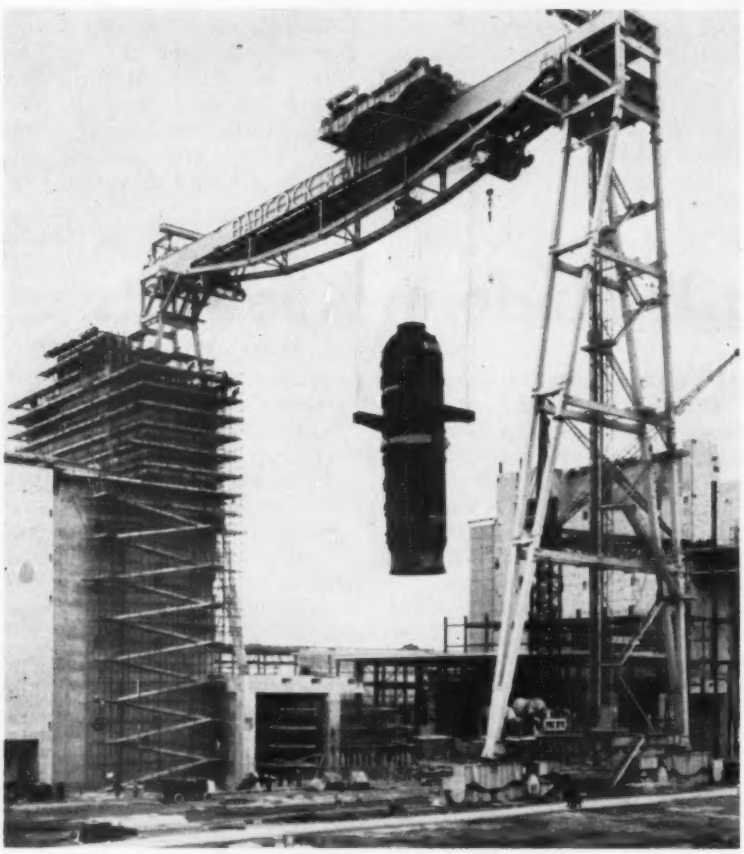
Baldwin stated in its bid that it proposed to subcontract 42.7% of its work to a Belgian firm—still qualifying it under Buy American terms. English Electric challenged B-L-H figures, claiming that if it had followed the specific instructions in the form, it would have been forced to show at least 55% of its work would be done in Belgium, only 45% in the U.S. By this calculation the company could not qualify for the Buy American price advantage.

English Electric was lowest unevaluated bidder for the eight 155,500 hp turbines ($6,214,552), but even a minimum 6% Buy American price boost would be enough to make B-L-H the lowest bidder—if qualified as domestic.

B-L-H admitted that it hadn't followed the specifics of the Reclamation form, but that it had followed the provisions of the Buy American Act and a subsequent executive order covering the 6% differential. It charged that the form was in error—especially paragraph 4 (b)—and that its bid shouldn't be prejudiced for failure to comply with an erroneous form.

The battle lines quickly grew, spreading from the Denver Reclamation office, where bids were opened last December, to the Interior Department in Washington. In January, the matter was dumped in the lap of the GAO.

Now that GAO has ruled, Recla-



Steam Unit Goes in English A-Plant

Hinkley Point Atomic power station, located beside the Severin River near Somerset, England, receives the shell of the first of 12 steam units that will be installed.

Hinkley Point, which is a joint venture of Babcock & Wilcox and English Electric Ltd, will have two reactors and be in operation in 1962. It will use natural uranium and be a sodium graphite-moderated, carbon dioxide-cooled full scale generating station. Cost will be about $168 million and generating capacity 500 Mw.

mation will once again review the bids, and should make an award shortly. The B-L-H bid is in a position to qualify as lowest.

Specifically, the GAO ruled that failure to follow an erroneous provision in the invitation did not disqualify B-L-H as a bidder.

Campbell said that he saw no grounds for prejudice against other bidders in the Glen Canyon invitation when he ruled in favor of B-L-H, as long as the award is made in accordance with law. He added that English Electric was wrong in suggesting it might have made a different bid, if it knew the bidding rules were different. Campbell also threw out the idea of junking all bids because, "The undesirable aspects of such a course of action far outweigh any possible advantage to the government."

Passamaquoddy Hearing Set for April 22 in Calais

The International Joint Commission, U.S. and Canada will hold a public hearing on the proposed Passamaquoddy Tidal Power Project in Calais, Maine, at 10 a.m. on April 22.

The purpose of the hearing, to be held in Calais Memorial High School, is to receive testimony and evidence bearing on the findings and conclusions set forth in the reports of IJC's Engineering Board and Fisheries Board. The commission is particularly interested in comments concerning alternative auxiliary sources of electric power presented in the engineering report.

IJC says all interested persons will be given a chance to express their views. U.S. interests wishing to be heard are urged to contact Mr. Sumner Pike of Lubec, Maine, chairman of the Maine Governor's Committee on Passamaquoddy, who will determine the order of presentations. Oral statements may be accompanied by written statements; where written statements are submitted, there should be 50 copies.

Edison Electric Institute has taken a position opposing the tidal project on the basis that it is now economically unfeasible. New England investor-owned electric utilities are expected to meet sometime during the week of April 25 to discuss the project.

Different Views on Nez Perce

Northwest Public Power Assn hears conflicting views on Nez Perce but passes resolution supporting WPPS application

Washington Public Power Supply System's application to construct the Nez Perce project took center stage and provided the only mild controversy raised in the annual meetings of NPPA April 6 to 8.

The convention passed unanimously a resolution commending WPPS and recommending that its members consider contracting for power from the project but not before at least one question of doubt was raised.

Myron Price, superintendent of the Eugene Water & Electric Board, raised the question which in turn was tied to the big question of the Nez Perce proposal-survival of the Columbia River salmon runs. In legislative committee consideration of the resolution Price balked at a blanket commendation of the WPPS application "without more knowledge than we presently have."

"Most of those who work in this region are aware that you cannot ignore any of its resources—*in toto* or in part," said Price. "We need more information about how the power will be distributed and about the handling of fish, which is the major problem. We want to know what terms and conditions we can get in buying power from a 'foreign corporation' which the WPPS would be to us in Oregon."

That the resolution is a prelude to enlisting specific support from the public power agencies of Oregon, Idaho, Montana and those of Washington not among the 13 PUD members of WPPS was obvious.

Owen W. Hurd, managing director of WPPS, in a panel discussion of the project revealed that a recommendation from the National Hells Canyon Assn executive board last Feb. 18 preceded the WPPS application.

"The intervention of NPPA and the National Hells Canyon Assn in the Mountain Sheep application faced a costly, futile and unrealistic prospect to prevent the issuance of a license for the (Pacific Northwest Power Co) High Mountain Sheep project," Hurd said.

"With legislative action to save Nez Perce (SCR35, the middle Snake moratorium on dam construction) moving slowly and proceedings before FPC on the High Mountain Sheep application accelerating, it was obvious that the time for action on a Nez Perce filing by WPPS."

The fish problem at Nez Perce can be solved, said Hurd, and first proposals for fish passage facilities "using methods of advanced and proven performance" will be filed in a few weeks.

Basic Research on Fish Needed

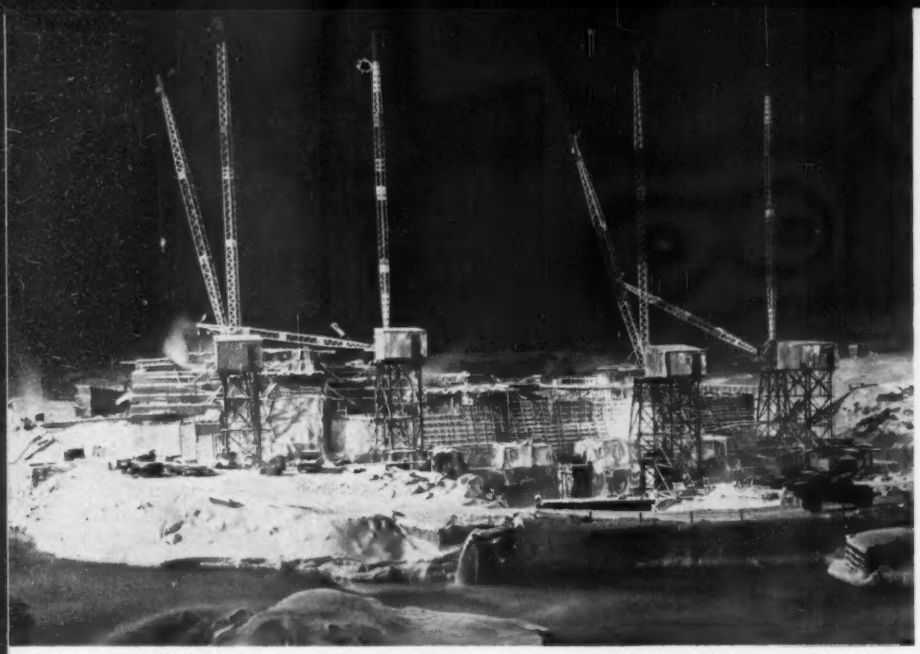
This view received little encouragement for a later speaker, Dr E. L. (Ted) Perry, director of the Columbia River Fisheries Program of the U. S. Fish and Wildlife Service. Much knowledge has been gained of how to put fish over high dams in the past few years, he said, but the methods are still not proven.

"We have already said it will take 15 to 20 years to solve the high dam fish problem in the middle Snake area." said Dr. Perry.

Criticism of the scope of the study conducted by Bonneville Power Administration last year on proposed Northwest-California interties came out in a panel discussion in remarks of Ken Billington, executive secretary of the Washington PUD Assn. Billington said requests of the three Pacific Coast states for delay of formalizing any intertie contract between BPA and Pacific Gas & Electric Co while H. Zinder & Associates completes study for California should be honored by the Interior Department because of shortcomings of the BPA study.

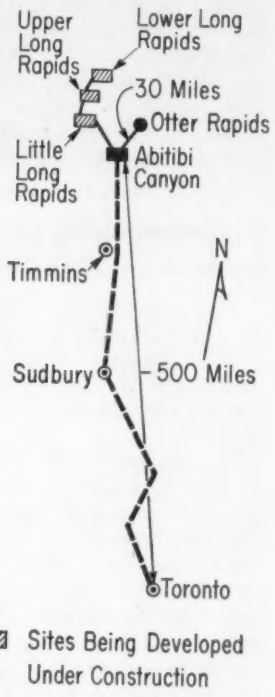
Dr William A. Pearl, Bonneville Administrator, next day defended both PG&E's offer to buy surplus BPA power at an annual return to BPA of $1.8 million and BPA's conduct of the study.

"It would save some power. It would save oil in California and it would give us revenue and I don't mind telling you Bonneville is looking for revenue," said Pearl.



CONSTRUCTION is around-the-clock at Ontario Hydro's Otter Rapids station, despite sub-zero temperatures; snow. Diversion port area is seen

SINGLE CIRCUIT 460-KV transmission is in plans for development of Ontario's James Bay watershed. Three planned plants are on left of "V" at top



With EHV Transmission, Ontario Hydro Thinks . . .

Remote Stations Are Economical

About 500 miles of 460-kv transmission line are being planned by the Hydro-Electric Power Commission of Ontario to deliver future power from the Abitibi Canyon region to markets as far south as Toronto.

Chairman James S. Duncan of Ontario Hydro has announced a six year construction program that includes three new hydroelectric stations on the Mattagami River and the EHV transmission line. These three stations plus Otter Rapids, which will be completed next year (see picture), will add 528 Mw generating capacity by 1966.

The three hydroelectric installations will go on the line in order from south to north, which is with stream flow toward James Bay, in 1963, 1965, and 1966. A "Y" shaped 230-kv system will link the three with Otter Rapids and an existing station at Abitibi Canyon, coming into a terminal substation. Initially the line from this gathering point south to Sudbury will be designed for 460-kv but will be operated as a double circuit 230-kv system. It will be changed to a 460-kv single circuit when the second of the three stations comes on the line in 1965.

In addition to line and station construction, Ontario Hydro proposes additional facilities at other stations, construction of access roads and three river diversions.

The Little Abitibi River will be diverted into the Abitibi upstream (north) of Otter Rapids to provide an increase of about 1,300 cfs for Otter Rapids and future plants.

Water flow to the three plants on the Mattagami River will be increased by diversion of part of the Opasatika River watershed to the Mattagami upstream (south) of the first of the stations.

Flood Bypass Provided

The third diversion project will permit excess water from the Mattagami River at the southern station to bypass the two lower sites via Adam Creek during flooding periods, saving about $13 million.

Ontario Hydro has an EHV test line at its Coldwater Project near Orillia, and has been making tests since last summer. Results have indicated that the six year development plant incorporating EHV transmission will be more economical than building thermal generation closer to the markets.

Duncan estimates that the development program will cost about $182 million, and that use of EHV will save "millions," as compared with construction of conventional multiple circuits. It will provide power carrying capacity about four times that of 230-kv, the highest voltage now in use in Ontario.

"The development of extra-high-voltage techniques is of vital importance today, not only to Ontario but to other provinces and many other countries," Duncan said.

"Early in the century, Ontario Hydro became one of the first utilities on this continent to employ high voltage transmission. Now we are taking another major step forward in a new field to overcome the problems of remote hydroelectric sites and high transmission costs."

MORE THAN 600 delegates and wives attended the 27th Annual Conference of the Southeastern Electric Exchange

Research Question Raised at SEE

- **Cresap points up traditional research participation**
- **Indicates public relations value of telling the story**

How much should electric utility companies participate in research and development work? Should they get in directly, or leave it all to manufacturers? Or is there a middle ground?

Heightened interest in these questions is becoming evident at many of the major electrical industry conclaves. The big Southeastern Electric Exchange Annual Conference held last month at Boca Raton, Fla., was no exception. At this meeting, the issue was tackled by Westinghouse Electric Corp President Mark W. Cresap, Jr.

Utilities have been participating in research through the history of the industry, Cresap reminded over 600 delegates from 27 southeastern power companies. Said he, ". . . it is you in the electrical utilities who pay a substantial share of the research cost. And certainly you are the reason for this research, the chief purpose of which is to help you deliver more electric power at lower cost."

Utilities were urged by Cresap to take advantage of the public relations value of their contributions to research and development.

"Because the success of our industry depends on public recognition and national appreciation of what we are doing, it is our common problem to focus attention on our industry's very major research and development effort," he said.

"It is not too early for us to begin concerning ourselves about this bright incandescent light of yours that is being hidden under a bushel of non-information ". . . we must see that your role is understood and appreciated by the general public, by your customers and stockholders, by your employees, by industrial leaders, by government and legislative officials."

Mrs. Utility Customer moves into her new home, asks for electric service, and gets not only electricity but also the appliances that she wishes to have. The utility company owns them (remember the telephone) and includes them in its rate base.

Is this a practice of the future?

When this novel idea is brought up there is a temptation to shudder and run, but still a person cannot ignore the growing popularity of colored—and of more telephones. Opportunities for load building would be great because the problem of purchasing expensive appliances is taken from the customer which is an incentive to have more of them.

This visionary thought is that of P. P. Stathas, president of Duff & Phelps Inc.

Stathas warned that the time has come for utilities to examine closely the relationship between incremental costs and incremental revenues under existing rate structures. With average annual consumption building up each year, he feels there is a possibility that the lower steps of the rate structure are not providing enough return.

A popular newcomer to SEE was Henny Kilowatt, a small electric car about to be produced by Henney Motor Co, Canastota, N.Y. (EW, Mar. 28, p 60) which busily carried delegates and wives around the neighborhood of the Boca Raton Club and Hotel.

Henney appeared at the meeting

to be shown off to utility companies who will be the first recipients of original limited production. More than 30 utilities have ordered the first 70 or more of the cars. Price at the present is $3,500, but this is expected to come down with volume production. Atlantic City Electric Co, Illinois Power Co, and Eureka Williams will have the first models.

An early use of the Edison Electric Institute report to the Senate Select Committee on National Water Resources was made by F. H. Coughlin, president of SEE and also of Central Louisiana Electric Co. He presented an abstract from the future power requirements study that shows the SEE region using 24.1% of the total for investor-owned utilities by 1980. The present relationship is 18.1%. SEE companies will grow about 500% by 1980 as compared with about 400% for the nation as a whole.

Coughlin credited rapid growth of manufacturing, a per capita income increase greater than the U.S. average, and an ideal climate for growth of electric heating, particularly heat pump applications, as three important factors in increased load.

Use Stockholders for PR Work

Letting stockholders actively participate in the public relations activities of the utiltity is an effective tool being used by Wisconsin Power & Light Co. Carl J. Forsberg, president, asked: "Isn't it plausible that we as executives of free enterprise electric utility companies can start the machinery in motion that will mobilize this potentially powerful group of stockholders? They are the people who will be hurt if the electric utility industry goes down under public power competition."

Forsberg's company has 26 years experience with active organization of stockholders within the company's service area. Such things as franchise elections and municipal ownership threats have been won by the company with the aid of the stockholders who are concerned.

Across the nation, Forsberg sees the force of 3.8 million stockholders as the utility industry's army for fighting the public ownership battle.

The need for an effective, industry-wide public relations program was emphasized by Joseph C. Bevis, chairman of the board of Opinion Research Corp, who said only 66% of the customers of investor-owned utilities know they are being served by a company instead of public organization of some kind.

Opinion Research conducts surveys of ECAP, and after one in 1947 issued the report that "Evidence from the survey indicates that this one thing alone—informing all private company customers that they are being served by a private company-would probably bring down over-all government ownership sentiment by approximately 8%."

"The public for the most part is not aware of the problems that the electric industry is concerned with. Furthermore, to be quite candid about it, the public is not particularly interested in them." Bevis pointed out that 63% of the people today are unaware of the fact that the federal government is in the power business.

Results to date of the Georgia Power Co "Correct and Capitalize" campaign, in which the company retains ownership of more of the service entrance equipment, and also helps the customer pay for adequate wiring, were reported by C. M. Wallace Jr.

Since the program became effective Jan. 1, there are 1,374 jobs under contract and 584 jobs completed, a total of 1,958 participants in the program.

Some advantages of a program of this kind cited by Wallace are:

- Increased major appliance sales,
- Improved system load factor, especially for those companies experiencing a summer peak,
- Improved rate of return for the additional investment: from about 4% in the first year to 6.06% in the third year, up to better than 8% in the tenth year,
- An industry rallying point or common meeting ground: it enlists the aid and cooperation of dealers, electrical contractors, builders, etc.

Other southern companies have indicated their interest in similar programs, and still others in different regions.

A slowing down, but not a halt, in the rise of inflation is foreseen by John D. Wilson, vice president of Chase Manhattan Bank, during the 1960's.

A more comfortable supply position, larger numbers of workers coming into the labor market, and other factors were cited as deterrents to inflation.

"At the same time I have the feeling that our people have become more sophisticated on this score, that they have come to place the avoidance of inflation higher on their list of priorities. I am not at all sure that we can avoid a further creep upward in the price indexes, even at best, but we may well escape the strong spurts that proved so disturbing in the Fifties," Wilson said.

Guilty Pleas Entered; New Indictments in May

Several more indictments are expected in early May in the government's antitrust case against electrical equipment manufacturers. First trial date was set for June 6, but this could be pushed back, possibly to September. First trial is on power switchgear assemblies charge.

Latest developments are guilty pleas that have been entered by Allis-Chalmers Mfg Co, I-T-E Circuit Breaker Co, and three A-C individuals.

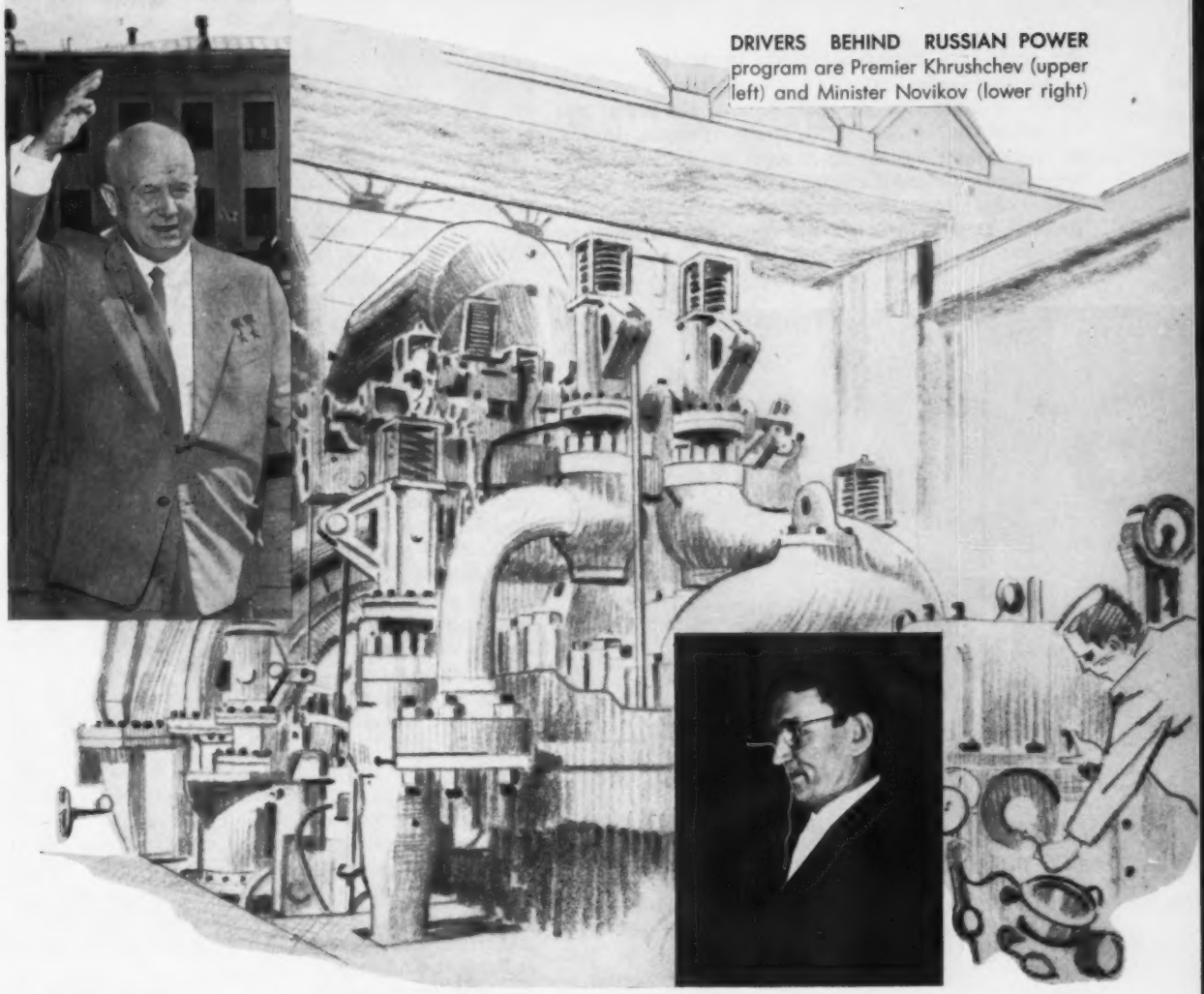
Allis-Chalmers pleaded guilty on the power switchgear assemblies and oil and air circuit breaker indictments. Three A-C individuals also pleaded guilty: L. W. Long on both indictments, and Frank M. Nolan and David W. Webb on the first.

I-T-E pleaded guilty on the first indictment, which, as the second, charges price fixing, business allocation, and bid rigging.

No date for sentencing has been set. Maximum penalty is $50,000 fine and one year in jail.

On the second indictment I-T-E pleads innocent as it has on three others in which it was named. All other companies and individuals have now registered innocent pleas after refusal of *nolo contendere* pleas by Federal Judge J. Cullen Ganey.

Both General Electric Co and Westinghouse Electric Corp have petitioned for a bill of particulars on the indictments. GE wants the names of all individuals who participated in the alleged price fixing meetings, as well as time and places. Westinghouse wants the names of only its own employees involved.



DRIVERS BEHIND RUSSIAN POWER program are Premier Khrushchev (upper left) and Minister Novikov (lower right)

USSR Leaders Press Power Men To Keep 7-Year Plan on Schedule

Current appraisal shows 7-year program running about on time, but tougher problems loom. Movement toward larger steam units is slow. Premier sets goals to 1980

PHILIP SPORN, President, American Electric Power Co

A new appraisal of Russia's seven-year (1958-1965) power expansion program is in order.

Several developments over the past few months provide additional material on which to bring our views up to date. (For an earlier appraisal of the Russian program, see "What Russia's Power Program Means," Philip Sporn, EW, Nov. 2, 1959, p 57.)

For one thing, preliminary figures are in on performance during the first year of the seven (table at right). The Soviet Union increased its installed capacity by 10.3% and its kwhr output by 13.3%. This might be termed quite satisfactory progress for the first year of a seven-year program. Gains made by U. S. utilities during the same period are provided for comparison.

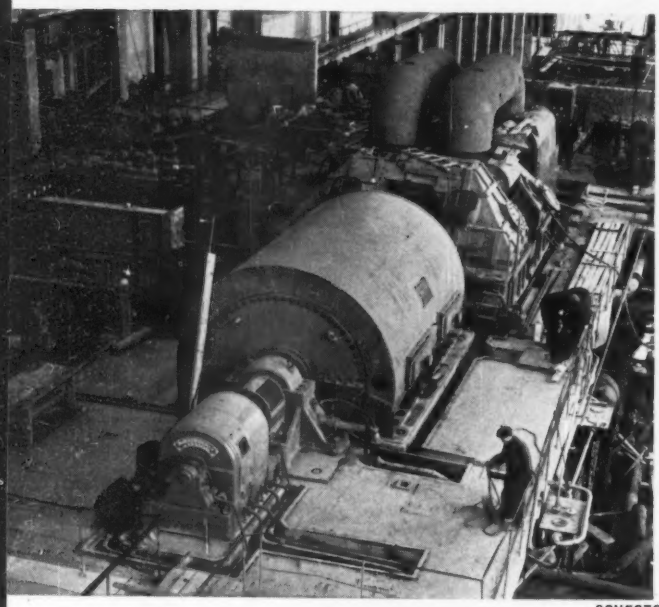
For another thing, we have a progress report made by I. T. Novikov, USSR Minister of Power Plant Construction, and an extended discussion offered by Premier N. S. Khrushchev. Both of them relate directly to

1959 Growth—in United States and Soviet Union

	Installed Capacity (thousands Mw)			Power Production (billions kwhr)		
	1958	1959	% Gain	1958	1959	% Gain
United States	142.6	156.6	9.8	645.1	709.7	10.0
Soviet Union	53.4	58.9	10.3	233.0	264.0	13.3

the seven-year power expansion program.

Novikov's report would indicate that not everything about the seven-year program is rosy. His report was carried in the Nov. 26, 1959, issue of *Pravda*. In this, he reviewed the projections of capacity additions for the seven-year plan and the work that has been done by the Power Industry Construction Trust, the Hydraulic Projects Design Institute, and other organizations by



SOVFOTO

TURBINE RATED AT 100 MW shown under construction at Prebaltic Power Station in Estonia. Plant will have six turbines; use local combustible shale as fuel

way of competition with the Thermal Power Plant Design Institute.

In discussing the contribution that 150, 200, and 300 Mw units with single boilers will make to the economy of thermal power plant construction, Novikov noted that such turbines and the boilers for them are not being developed satisfactorily in his country. The designs for some of them, he noted, have not even been worked out. Only the advance model of a 200-Mw turbine has been built and only a small number of 150-Mw turbines with boilers have been produced.

Novikov further commented that installation of these units is being delayed because of the lag in the manufacture of boiler feed, condenser circulating water pumps, mills, and other equipment. In the case of the 300-Mw turbines, only the technical designs have been worked out. Production has not yet been started despite the fact that such units are scheduled for installation at power plants in 1961-1962. In the case of the 600-Mw units, the design work has not even been started.

Matters are even worse, Novikov continued, in the production of boilers with an output of 650 tons of steam an hour (boilers for 300-Mw units). To add further to the difficulties, he noted that the situation with regard to the design and production of auxiliary equipment for large thermal power plants is troubling the Russians charged with this responsibility.

Because of this considerable concern about the further development of the electric power industry, the Party Central Committee and the USSR Council of Ministers decided to convene an all-Union conference on power plant construction. This conference, to discuss problems of accelerating construction and reducing costs of power plants, opened in Moscow on Nov. 26, 1959, the same day the article by Novikov appeared in *Pravda*. On Nov. 28, Premier N. S. Khrushchev delivered a long address to the conference.

Realization of Program Will Not Be Easy

Novikov's November report summarizing the performance of the Russian power system builders some six months after May, 1959, shows that the essential aims and projections of the program have not been modified. It is statistically possible that the continuation of the 1959 percentage increase over the next six years with only slight improvement will meet the projected goal of about 113 thousand Mw by 1965. This means that for the next six years the total capacity installed per annum will have to be raised from 5,500 Mw in 1959 to an annual average of 9,000 Mw.

No one familiar with the performance of the Russian economy in attaining predetermined goals would dismiss lightly the possibility of reaching this six-year goal in electric power. But it is not going to be an easy task, particularly in view of the Russians' lack of experience in the design, construction, and operation of stations and component equipment with the technological objectives and parameters they have set. We in the United States did not do that in so short a period, but then perhaps we did not have the advantage, both positive and negative, of the drive of a person as formidable as Premier Khrushchev.

Khrushchev's speech of Nov. 28 must be considered an important factor in the Russian power program.

On that occasion Khrushchev spoke for perhaps close to two hours. The condensed text of his speech runs to 9,000 words. It was a typical Khrushchev talk. Addressing the managers and technicians charged with the responsibility of carrying out the Russian power program, his speech is a mixture of revival meeting talk and shrewd judgments of men, work, and processes —many of them highly technical. In some instances his talk seems without reasonable basis, but it is evident from the nature of the response evoked that he had a strong effect on his listeners. When Khrushchev finished, the audience must surely have returned to their offices to try to find ways of improving on their jobs, even though some of the ideas they heard must have appeared fantastic to the engineers and technicians among them.

Time Is Basic Reason for Emphasizing Thermal

A number of Khrushchev's observations and some of his most intriguing points require separate comment —especially on the question of thermal or steam power versus hydro power. Khrushchev took to task some of the engineers who complained because, at the commissioning of Lenin Volga Hydroelectric Station, he had said that priorities should go to thermal stations.

HYDRO DEVELOPMENT, such as Kuibyshev project, will get lower priority under present seven-year plan

These engineers felt that hydroelectric plants would produce power at a cost per kwhr of one-sixth to one-tenth the cost of thermal generation. Khrushchev agreed "that any fool can see that power from a hydroelectric station is cheaper," but that they had to decide in Russia which is more advantageous if the time it will take to get the power is considered. "Is there," he asked, "an advantage to building a station that will produce power five years later? This is worth some thought because we may lose five years in the competition with the capitalist countries."

This rationalization of the current Soviet policy in favor of thermal-electric power is interesting, but Novikov two days earlier developed the reasons more fully when he said, "The 21st Party Congress raised with particular force the question of accelerating power construction and reducing its cost in order to gain time *and to make the most effective use of capital investments.*" (Italics supplied). And this, he said, is the reason the main emphasis will be on the preponderant construction of thermal power plants operating on cheap coal, natural gas, and fuel oil.

The complete rationalization appears to be a combination of Khrushchev's view and that of Novikov. In the Premier's language, "there is no quarrel over which is better. Both are good. Hydroelectric stations would be better if they could be built faster. But at this stage thermal stations are better, as it takes less time to get them going."

Novikov, perhaps, would add that they are better because, generally speaking, they make the most effective use of capital investments. This, obviously, is not so far different from what would be the general conclusion in the United States.

New Goal—Electrifying Russia in 15-20 Years

Premier Khrushchev in his speech proclaimed a new goal, completely electrifying the country in the next 15 to 20 years. By this, he meant, "fully meeting the power needs of all branches of the national economy, including the total needs of industrial and collective farm production, as well as bringing about a sharp rise in the expenditure of electric power in satisfying the communal and everyday needs of the population—lighting, household electrical appliances, radios, television sets, cooking, water heating, and so on."

Further, he pointed out that the plan calls for the "extensive development of production operations that are heavy power consumers on the basis of cheap power obtained from large thermal stations burning strip-mined coal and from the large hydroelectric stations being built on the rivers of Central Siberia." This is the same goal that has been an accomplished fact in the United States for many years.

New 15-Year Goals Beyond 1965 Set

Khrushchev also gave suggested additional energy goals for the Russian power economy. In terms of energy he set the following output goals for a 15-year period beyond 1965:

Year	Energy to Be Produced (billions of kwhr)
1970	900
1975	1,500
1980	2,300

This projection is interesting from a number of standpoints. First, it contemplates by 1980, or in 22 years, a ten-fold increase over the energy generated in 1958 (233 billion kwhr). Twenty-two years is a short time for such an impressive increase. Second, the 1980 goal is the same as the conservative estimate of the likely kwhr generation in the United States by 1975, and which by 1980 is expected to grow to somewhere betwen 3,000 and 3,200 billion kwhr. Third, as the 1965 goal is only 500 billion to 520 billion kwhr, the 1980 goal represents a further increase of four or five-fold in the succeeding period of 15 years. This may or may not be attainable even in the dynamic Russian economy.

It may be that final Russian achievement will fall shy of the set goals in energy production. It is, however, important to remember that the use to which the Russians put many of their basic materials—not only electric energy but steel and aluminum for example—is different from ours. That difference brings in important imponderables in any evaluation of relative strengths, particularly from a defense viewpoint, of Russia and ourselves.

In connection with the same program, Khrushchev himself realizes that certain central problems will have to be solved. "How," he asks, "can this rapid rate of growth of the power system be realized?" Then he proceeds to answer himself rather blithely. "It can be done," he says, "only by building thermal power plants of 2,400 Mw capacity and more" and also "by building highly economical hydroelectric stations of up to 5,000 Mw to 6,000 Mw with generation units of 500 Mw each."

Here it is pertinent to note, and it is not clear that Khrushchev is aware of the fact, that because electric energy cannot be produced and stored, the achievement of this 1980 goal depends also on the ability of the power-using economy—industrial production; commercial and residential use; and rural electrification—to grow sufficiently to require and to be able to use this rapid increase in electric energy generation.

The Russians have an advantage in that their Premier

determines the size of thermal and hydroelectric plants and the actual size of units in stations not yet projected. This eliminates the need for engineering studies and results in saving of considerable time and expense. It also has in it, however, the difficulties of the gap between projection and achievement pointed out by Novikov in his address of Nov. 26.

Khrushchev Plan to Speed Hydro Construction

Another interesting point discussed by Khrushchev was speeding up the scheduling of turbine installations at a given hydro project. Specifically, the Premier asked why, once a dam is completed and you normally go about commissioning the first turbine, then the second, "what keeps you from commissioning 22 turbines simultaneously, instead of just one?"

When a voice from the floor said, "It depends on deliveries of equipment," Khrushchev said that, as he saw it, it was obviously much better to expand turbine building facilities so that the construction may receive not one turbine at a time, but in a single consignment as many turbines as are needed "to ensure more rational installation at the building site."

When the Premier further asked if he was right, voices from the floor answered that of course he was. This apparently settled the matter.

Soviet Economics Stress Energy Availability

Khrushchev discussed the relative economics of power generation, power transmission, and industrial development and laid down the dictum that generally the plan should be "to site new enterprises in the vicinity of large power stations under construction, and to build these enterprises at a rate enabling them to go into operation simultaneously with the power stations."

This is on the theory that it is "fitting that industrial enterprises that are big power consumers, such as large aluminum, chemical, and other plants, be built in the proximity of the large hydroelectric stations of Siberia so that they can avail themselves of cheap power." The cost of transporting raw materials, the cost of settling populations at many out-of-the-way locations, the cost of transporting the semi finished products to industrial centers for further fabrication and the finished product to its ultimate destination—none of these factors were mentioned by the Soviet Premier. There is no indication that any of his listeners brought up these critical matters.

Rural Electrification Had Its Downs

Finally, Khrushchev told a very interesting history of rural electrification in Russia. "There was a time," he said, "when we had a wrong attitude toward the electrification of villages. A taboo existed that forbade villages from obtaining power from state girds. Every collective farm was supposed to electrify its operations on its own."

Premier Khrushchev went on to recount a story of Comrade Popov, Secretary of the Moscow Province Party Committee, telling him in 1949 that they had accomplished an important task set by Lenin and had electrified the province.

When the Premier later looked into matters to see what sort of electrification it was, "it turned out to be a kind for which people should be ashamed." The Party Committee had apparently "taken all the motors seized during the war, overhauled them, and shoved them on the collective farms in guise of aid from patrons. They had attached electric generating assemblies to the motors and then sent the collective farms a bill." In addition, "the State Bank was exacting a lot of money for the motors in the bargain, and the collective farms had no money. The farmers were outraged. The result was not electrification, but a perversion of it."

This, Khrushchev said, is not the way to do things. "The electrification of the countryside should be carried out on a carefully thought-out basis, by districts, so that it is actually Leninist electrification. Whenever a state transmission network runs through, it would be a good idea to link the collective farms to it, and where no such network exists a branch circuit should be built. In the case of collective farms remote from state electric networks, standard plans should be drawn up for rural regional power plants, which should be of the greatest economy so that agriculture receives cheap power. The collective farms can do this at their own expense."

One cannot help wishing for an opportunity to discuss with the Soviet Premier rural electrification as it is practiced in the United States, to exchange experiences, and to make comparisons. The idea of connecting electric distribution systems to power grids, public and private, has been practiced in the United States for many decades, without the realization that this apparently represented Leninist electrification.

Place of Atomic Power in Soviet Program

In a previous article (EW, Nov. 2, 1959, p 57) I pointed out the sharp delimitation placed on atomic power in the seven-year program. It seems to be still further de-emphasized now. Neither in the Nov. 26 paper by Minister Novikov nor in the long discussion by Premier Khrushchev on Nov. 28 of that program and of the 15-year program, 1965-1980, was a word apparently said about atomic power, nor the place of nuclear power in a projected annual production of electrical energy reaching the impressive figure of 2,300 billion kwhr in 1980.

Previous EW Articles on Russian Power

Soviet Economic Rivalry Dominates-EEI Convention
(EW, April 20, 1959, p 84)

What Russia's Power Program Means
(EW, Nov. 2, 1959, p 57)

Iron Curtain Raised to Reveal Score on Russian Power
(EW, Feb. 22, 1960, p 42)

Congress Will Review Soviet Progress in 1960
(EW, Dec. 28, 1959, p 61)

Soviet Exhibition Shows Off Progress in Power
(EW, July 6, 1959, p 51)

Split Widens on Soviet Progress
(EW, Nov. 16, 1959, p 65)

5th Special Report on

commercial cooking...

Now a Full-Fledged Member of the Commercial Load Family

Special Report by
John D. Damon
Assistant Editor

- Hotpoint survey disclosed that 72 utilities added 455,971 kw total load in 1959; 407,886 kw in 1958
- Commercial electric cooking load jumped from one million kw to 9.5 million kw in the past decade
- Earnings also reflect growth. Commercial electric cooking earned annual revenue added in 1959 totaled $10,829,698, and $9,659,558 in 1958

commercial cooking...

Food Service Operators — 177,234

All-Electric Kitchens ..... 17,654 (10.8%)*
Partially Electric Kitchens ..... 86,980 (53.1%)*

	Division A	Division B	Division C
Food Service Operators	15,630	48,241	113,363
All-electric Kitchens	3,200 (21.7%)*	4,406 (10.7%)*	10,048 (8.9%)*
Partially electric Kitchens	8,025 (54.3%)*	21,125 (51.5%)*	57,830 (51%)*

*Not all companies reported breakdown.

Commercial electric cooking is now a full-fledged member of the commercial load family.

In 1950, total commercial cooking load was only about a million kw. In 1954, it was 4.4 million. By the end of 1959, it had jumped to 9.5 million kw.

This represents a gain of 116% from 1955-59 for commercial cooking. Comparing this with the growth in total commercial load (% gain based on energy sales) which was 39%, one sees that indeed commercial load can be proud of its industrious son—commercial electric cooking.

What has brought about this load growth? Who are some of the outstanding companies that have proved that commercial cooking *is* a good load booster and that it can be sold; that electric cooking is the modern way for restaurants, institutions, hotels, schools, hospitals and employee cafeterias?

Commercial electric cooking grew up and matured in the fifties. What lies ahead in the dynamic new decade?

These are some of the questions which will be considered in this, Electrical World's Fifth Commercial Cooking Special Report.

There are 6.4 million commercial customers in the country today, of whom 565,000 are food-service operations. Thus, commercial cooking accounts for 8.8% of the total commercial market.

To find out what has happened in commercial cooking in the past two years, and with a look-see at the over-all ten year picture, Hotpoint Division, General Electric Co, surveyed 72 key utilities who are active participants in selling, promoting, and servicing commercial cooking.

This report covers the full years of 1958 and 1959. The 72 utilities represent two more than were surveyed in 1957, and 20 more than participated in the first survey in 1954. Utilities in this year's survey serve customers in 42 states.

Hotpoint's survey covered 177,234 of the 565,000 food service establishments, or 32% of the total market. All-electric kitchens, the big load builder in commercial cooking, figured out to 17,654 all-electric kitchens in the territories of sampled utilities. There were also 86,980 partially electric kitchens. Or to put it another way, 10.8% of the nation's food service outlets were all-electric; 53.1% were partially electric.

In 1958, 8% of all the commercial kitchens were all electric, and 42% were partially electric.

In 1957, the added load (407,886 kw) averaged 5,665 kw per surveyed company. But in 1959 it grew to an average of 6,333 kw/co (total new load of 455,971 kw).

Earnings, too, reflected growth. The survey revealed new CC EAR for 1957 was $9,217,151 for surveyed utilities. This went up to $9,659,558 in 1958, and rocketed to $10,829,698 in 1959.

Earnings per kw averaged by the 72 reporting companies were $23.68 in 1958 and $23.75 in 1959. In 1954, however, they totaled $23.40.

While commercial cooking started out slowly at the beginning of the 1950's, it began to pick up momentum once the half-way mark was reached, and was really stepping as it came down the stretch.

In 1957, 68 key utilities added 395,395 kw of new commercial cooking load. In 1958, 70 utilities added 407,886 kw. But by the end of 1959, total commercial cooking load added by 72 key utilities was 455,971 kw.

These facts, key ones culled from the Hotpoint study, point to a deeper penetration by electric cooking into the nation's mass feeding establishments.

Evidence of an increase in the importance of commercial cooking in the eyes of utility sales managers can be drawn from the response elicited by

this year's request for cooking survey information.

Thirty-three of the 72 companies reporting this year declared a sales expense of $1,038,551 in 1959. This was up $820,079 from 1957.

The national average, 33 companies reporting, of sales expense per food service account in 1959 was $15.01, up from $14.37 in 1957, and $13.62 in 1956.

The national average of sales costs per dollar of commercial cooking revenue was 24¢, a decrease from 26¢ in 1957 and 34¢ in 1956.

To break the results down on the fairest basis—small utilities cannot be expected to compete with the giants on the basis of manpower or moneypower—the 72 companies were broken down into three divisions:

- Division A utilities under 170,000 total meters
- Division B 170,000 to 350,000 meters
- Division C 350,000 meters and over

The total figures reported in the paragraphs above and on the preceding page are fine when considering the over-all market, but how does a utility figure out its role or potential in the search for new commercial cooking load?

To enable utilities to do this, a report broken down by division follows.

Division A added 60,686 kw new cooking load in 1959, and this brought in $1,360,699. This figured out to $22.42/kw.

Division B added 114,473 kw, bringing in $2,830,264, at $24.72/kw. Division C added 280,812 kw new cooking load in 1959, for $6,638,735 and a $23.64/kw average.

A breakdown of all-electric kitchens, and partially electric kitchens, can be determined by scanning the chart on p 76.

The new 1959 cooking load realized from new construction—i.e. electric cooking going into completely new establishments—constituted 57.1% of Division A's new load; 55% in Division B and a big 76.4% in Division C. Remodeling or replacement—where a food service establishment was renovated or enlarged, or where old equipment wore out and was replaced.—Division A realized 42.9% of new load from this, Division B, 45%; and Division C, 23.75%. (See chart p 82).

Two of the giants in Division C (over 350,000 meters) cracked the 30,000 kw barrier in 1959—commercial cooking's four-minute mile. Southern California Edison Co got 34,687 kw in 1959 from 14,500 customers, and Pennsylvania Power & Light Co received 33,615 kw from 6,000 customers.

Significantly, the top ten companies in Division C all added more than 10,000 kw each in 1958 and 1959 for the first time in commercial cooking history. Ten of the 20 companies in Division C have added from 80,000 to 187,744 kw. Among them, the 20 companies in C have added 1,518,249 kw in the past decade. Based on the 1959 average of $23.641 kw this load produced an EAR of almost $36,000,000.

In salesman's language, salespower on the firing line looks like this, according to the findings of the Hotpoint survey. Division A had 21 commercial cooking specialists, averaging .8 per company. Division B had 37 full time commercial cooking specialists (1.5 per company); and Division C has 82 CC specialists, for an average of 4.1 per company.

Southern California Edison had 16 full-time specialists; Detroit Edison had 13. Montana Power had five and two others had four each.

All-purpose representatives, who do other things besides sell and service commercial cooking accounts, augment the sales promotion efforts of the commercial cooking specialists. They totaled 178 for Division A, and these men spent 18.2% of their time on commercial cooking. Division B had 367 all-purpose reps spending 12.5% of their time on cooking, while Division C had 545 of these representatives and they spent 15% of their time.

Ohio Power Co had 46 all-purpose reps who spent 25% of their time on commercial cooking, Texas

Results	Division A	Division B	Division C
New cooking load added			
1959	60,686 kw	114,473 kw	280,812 kw
Past 10 years	518,188	660,347	1,517,249
Total New EAR for 1959	$1,360,699	$2,830,264	$6,638,735
EAR/kw	$22.42	$24.72	$23.64
New Load Per FS customer—10 years	40.46 kw	15.60 kw	18.90 kw

Power & Light had 26 who spent 25% of their time selling commercial cooking the electric way.

The total man-years per 1,000 commercial cooking customers expended by Division A amounted to 3.42. Division B's was 1.71, and Division C's, 1.42.

All programs must be backed up with expenditures of money. Commercial cooking is no exception.

Average sales expense per food service account was:

Division A	$42.79
Division B	$16.35
Division C	$10.03

Average sales expense per dollar of EAR, or what it costs to get what a company earns from commercial cooking, was 35¢ for Division A, 25¢ for B and 20¢ for C.

Training of commercial cooking representatives is a must in any good CC program.

In 1958, 16 of the 21 commercial cooking specialists in Division A received equipment manufacturers' sales education, and 128 of the 178 all-purpose reps benefited. Division B exposed 31 of its 37 commercial cooking specialists and 259 of its 367 all-purpose reps to such training. Division C saw that almost 100% of its all-purpose representatives attended commercial cooking training courses, and 51 of the 82 commercial cooking specialists.

A slight decrease was experienced in Division A in 1959 in this area. Ten commercial cooking specialists and 124 all-purpose reps received training from equipment manufacturers. Division B stayed the same regarding its CC specialists, 31 attending, but had a slight increase in the number of its all-purpose representatives—289, as compared with 259 in 1958. Division C sent 73 commercial cooking specialists to such courses, and again registered almost 100% of its all-purpose representatives.

In the spring a young man's fancy lightly turns to thoughts of . . . goes the old saying. In spring, commercial cooking men fancy hard-hitting advertising campaigns to woo FS customers to the all-electric cooking way. Next to year-round campaigns (utilities reporting in the survey said they held 33 year-round sales drives) most commercial cooking ad campaigns are held in the spring. Twenty-seven companies reported favoring this time of year for pushing electric commercial cooking. Eleven others promoted in the fall.

When it comes to commercial cooking promotion there are many different ways to promote. For a

Salespower	Division A	Division B	Division C
Commercial cooking specialists	21	37	82
Average per company	.8	1.5	4.1
All-purpose representatives	178	367	545
Time spent on commercial cooking	18.2%	12.5%	15%
Budget			
Sales Expense (including salaries)	$225,509 (13 of 27 cos)	$445,179 (14 of 25 cos)	$367,863 (6 of 20 cos)
Ranging from	$3,250 to $42,000	$10,000 to $61,260	$19,000 to $128,000
Average	$17,347	$31,799	$61,311
Average Sales Expense			
Average sales expense per FS account	$42.79	$16.35	$10.03
Average sales expense per $ of EAR	.35	.25	.20
Man-years			
Total man-years/100 CC customer	3.42	1.71	1.42

commercial cooking...

New Load Added By Commercial Cooking

Division A	10 Years		1958		1959	
	New Load	Place	New Load	Place	New Load	Place
Idaho Power	85,000 kw	1	8,945 kw	1	8,780 kw	1
Potomac Edison	37,916	2	3,500	5	5,058	2
Knoxville Utilities	35,000	3	3,400	6	3,000	7
Washington Water Power	35,000	3	4,131	2	2,640	11
Worcester County Elec.	27,141	5	3,522	4	4,638	3
Chattanooga EPB	26,712	6	2,960	9	4,410	4
Minnesota P&L	25,000	7	2,600	12	2,165	14
Kentucky Power	20,377	8	2,088	13	2,422	12
Merrimack-Essex	20,000	9	1,736	14	2,271	13
Western Mass. Elec.	18,254	10	2,704	11	2,888	9
Wisconsin Pub. Service	17,971	11	3,157	8	2,725	10
Omaha PPD	17,000	12	3,372	7	1,940	15
Kansas Gas & Electric	16,230	13	1,643	15	2,964	8
SMUD	15,300	14	2,815	10	3,043	6
Nashville Electric	NA	—	3,963	3	3,872	5
Division B	**New Load**	**Place**	**New Load**	**Place**	**New Load**	**Place**
Texas Power & Light	58,000 kw	1	8,466 kw	1	9,379 kw	1
Atlantic City Elec.	58,000	1	7,181	2	4,833	11
Florida Power	50,902	3	4,390	10	4,837	10
Gulf States Utilities	44,181	4	6,951	3	8,094	2
Potomac Electric	42,508	5	5,005	7	4,341	12
Oklahoma G&E	36,000	6	5,694	4	6,600	4
Metropolitan Edison	35,000	7	4,284	11	5,025	8
Cincinnati G&E	35,000	7	3,763	14	4,071	14
Utah Power & Light	32,925	9	4,163	12	4,200	13
Seattle Dept. of Lighting	29,387	10	4,089	13	4,957	9
Wisconsin Power & Light	22,307	15	4,754	8	3,909	16
Arkansas Power & Light	19,900	16	5,280	5	5,320	6
Central Power & Light	15,000	19	3,244	17	6,126	5
Southwestern Pub. Service	14,444	21	4,500	9	5,124	7
Portland General Electric	NA	—	5,061	6	8,075	3
Division C	**New Load**	**Place**	**New Load**	**Place**	**New Load**	**Place**
Pennsylvania Power & Light	187,744 kw	1	27,398 kw	2	33,615 kw	2
Southern California Edison	159,313	2	31,197	1	34,687	1
Appalachian Power	142,067	3	16,269	4	16,932	5
Georgia Power	120,650	4	15,798	5	15,134	9
Ohio Edison	105,456	5	15,139	6	15,817	6
Ohio Power	102,875	6	11,925	10	15,560	7
Duke Power	92,829	7	13,871	7	15,215	8
No. States Power	89,000	8	11,834	11	13,058	11
Detroit Edison	82,500	9	13,125	9	19,782	4
Carolina Power & Light	80,000	10	13,444	8	13,909	10
Commonwealth Edison	NA	—	22,007	3	25,939	3

New KW Per "Weighted" FS Customer

Division A

Company	10 Years	Company	1959
Knoxville Utilities	194.4 kw	Knoxville Utilities	15.00 kw
Idaho Power	106.3	Idaho Power	11.28
Chattanooga EPB	69.9	Chattanooga EPB	10.79
Kentucky Power	64.7	Kentucky Power	6.93
Minnesota P&L	61.7	Minnesota P&L	4.82
Washington Water Power	48.6	Weymouth L&P	4.46
Merrimack-Essex	41.9	Merrimack-Essex	4.29
Potomac Edison	33.7	N. Berkshire Elec.	4.11
Attleboro Electric	30.2	Potomac Edison	4.05
Omaha PPD	29.1	Worcester Elec.	3.86

Division B

Company	10 Years	Company	1959
Texas P&L	42.7 kw	Central P&L	6.25 kw
Atlantic City Elec.	35.8	Texas P&L	6.21
Gulf States Utilities	35.1	Portland G&E	6.06
Toledo Edison	30.4	Gulf States Ut	5.78
Florida Power Corp.	27.6	Seattle City Lt.	3.99
Seattle City Lt.	26.2	Toledo Edison	3.60
Utah P&L	24.4	Southwestern E P.	3.57
Metropolitan Edison	22.9	Kansas P&L	3.30
Mississippi P&L	19.0	Mississippi P&L	3.19
Wisconsin P&L	17.7	Metropolitan Ed	2.95

Division C

Company	10 Years	Company	1959
Appalachian Power	39.5 kw	PP&L	5.60 kw
PP&L	34.8	Ohio Power	4.31
Ohio Power	31.7	Duke Power	4.27
Duke Power	28.9	Appalachian Power	4.23
Ohio Edison	24.0	Virginia Elec. Pwr	4.00
West Penn Power	22.3	Ohio Edison	3.30
N. States Power	22.0	Carolina P&L	3.20
Georgia Power	21.4	N. States Power	2.90
Carolina P&L	20.4	Penn Electric	2.84
Union Electric	20.2	West Penn Power	2.44

complete run-down of how many utilities surveyed used these proved devices check the chart on page 81.

However, a breakdown by division follows:

Eighteen companies in Division A installed 793 free-trial devices from January, 1958 through December 31, 1959. Twenty-four Division B companies installed 2,494 devices. A total of 6,979 free-trial devices were installed in 16 "C" utilities.

All this activity paid off too. Conversion into sales was high at all companies. Division A converted 74.6% of its free trial devices into sales; Division B had an 84.1% total, and in Division C, 70.6% were bought after free trial.

How are utility commercial cooking promotions set up? Do most power companies tailor their own promotions or do the majority look to manufacturers for advertising ideas?

Forty-three companies tailor their own promotions; 31 adapt manufacturer promotions; and 13 tie in with equipment manufacturer promotions. There is some overlapping here as 20 companies reported they used more than one in setting up their own particular promotion.

Dealers and manufacturers cooperate closely with promotional efforts. The 72 utilities reported that they participated in 290 of these dealer-manufacturer efforts. The breakdown: Division A, 67; Division B, 86; Division C, 137. Ohio Power Co held 22 such cooperative promotions.

Architects can be vital salesmen in recommending commercial electric cooking to food service operators. That utilities realize this is evidenced by the survey results. Companies in Division A made 508 semi-annual calls on architects to push commercial electric cooking; Division B made 1,023; and Division C, 1,773 semi-annual visits to architects' offices in 1958 and 1959.

Georgia Power Co is the leader in this area making 600 semi-annual calls and 250 quarterly calls.

Ten Division A companies subscribe to Dodge Service. Eighteen Division B companies and seven Division C utilities subscribe to this service. In Division A, there were 387 leads from Dodge reports followed up, and 36.2% turned into sales. Division B companies followed up 2,155 leads and converted 16.8% into sales. Leads totaling 4,130 were followed up in Division C and 13.5% were sales converts.

Of the utilities surveyed it is interesting to note that 37 companies did no advertising whatsoever when it came to commercial cooking.

Of the utilities who offered wiring subsidies to commercial cooking accounts, most averaged around $4 or $5/kw.

Kitchen layouts for new customers figured big in 1958-59 plans at commercial cooking conscious companies. Seventeen power companies in Divi-

C. C. Promotions: How They are Used and How They Paid Off

Promotion	Results — Remarks
Free Trial Installations	Fifty-eight companies put in a total of 10,266 devices in 1958-59. 74.2% were converted into sales.
Dealer-Manufacturer Promotions	Sixty-seven companies participated in 290 of them in 1958-59.
Dealer Incentives	Twenty-three companies have dealer incentive plans. These range from fishing trips, outings, to cash, merchandise and prestige awards.
Calls on Architects	Sixty companies made 3,304 semi-annual calls during survey period.
Dodge Service	Thirty-five companies subscribe, making 6,672 follow-up calls converting 15.6% of leads into sales.
Direct Mail	Used by 69 companies.
Advertising	Thirty-three companies advertise in local newspapers and trade magazines, (Detroit Edison buys 30 pages, So. Cal. Edison 34 pages annually).
Wiring subsidy	Twelve companies subsidize from $1/kw to $2,500 for 1st 16kw (and $150/kw thereafter).
Kitchen layouts	Fifty companies carried out a total of 3,044 kitchen layouts during 1958-59.
Model Kitchens	Twenty companies report having such kitchens. One has five, two have three. one has two.
Door-to-door calls	Bell-ringing rates high on list. The 72 reporting companies call on 75.6% of their 177,234 total prospects annually.
Follow-up calls on new customers	All 72 companies follow-up on 97.8% of new customers to insure satisfaction after installation (62 companies check up on 100%).
Food Service Magazine	Sixty-eight reporting companies regularly mail Food Service Magazine to 38.8% of their prospects.
Satisfied Customer Cooperation	Sixty-nine companies report 9,824 satisfied customers who permit inspection of their kitchens by new prospects.

sion A made 535 kitchen layouts for new customers. Twenty-one companies in Division B made 1,172 layouts. Twelve companies in Division C made 1,337 kitchen schemes.

Some utilities found it advantageous to have model kitchens on their premises for meetings and demonstrations; 20 companies in all used this device. Four had more than one. Appalachian Power had five; Duke Power and Ohio Edison each had three.

Does your company have devices for demonstration and/or loaner equipment purposes? Division A companies carried 180 counter-line and 27 heavy-duty pieces of equipment. Division B carried 310 of the former and 74 of the latter, and Division C, 695 and 137, respectively.

Division A commercial cooking sales manpower called on 85.9% of its food service prospects annually. Division B called on 72.4%. Division C did leg work to 75.6% of its FS prospects.

Practically all food service customers were called on after the electric cooking equipment was installed to make sure it was working properly and that the new customer was completely satisfied. Division A called on 99.7% of its new installations; Division B returned to 99.8% and Division C, 92.9%.

Nothing succeeds like success. So, utilities took new electric cooking prospects to recent all-electric kitchens to present the benefits of electric commercial cooking. In 1958 and 1959, 24 companies in Division A had 1,640 of their customers who permited inspection of their kitchens. Division B had 3,396 and Division C had 18 companies with a total of 4,788 inspection kitchens.

Most companies were unable to compute the percentage which commercial cooking revenue represented of total commercial revenue and total revenue. Therefore, a true national figure is hard to come by. Of those that had such records, however, one power company got 27% of its total commercial revenue from commercial cooking and 9.0% of its total revenue.

Commercial cooking represents what percent of total commercial load and total load? Again, many utilities did not have available figures to compute this but, of the ones that did, these figures are available. For total commercial load there was a range of from 1.5% to 31.6%, with a mean of 12.5%. For total load, there was a range of 0.2% to 13% and a mean of 3.0%.

The greater percentage of commercial cooking load usually comes from new construction. Los Angeles Department of Water & Power got 80% of its new load in 1959 from this area. Kentucky Power Co and Louisiana Power & Light Co each received 90% from new building. Iowa Electric Power Co got 90% of its new commercial cooking load from remodeling, replacement, etc.

Commercial cooking kilowatts come from many markets. Detroit Edison got 65% of its added load from commercial restaurants. Atlantic City Electric Co got 75% of its added load from commercial restaurants. Southern Berkshire Power & Electric Co secured the most additional load from hotels and motels—50%. Kentucky Power Co got 40% from schools, and 12 utilities received more than 30% from that source. Four utilities received 20% of their added load from hospitals. Southern California Edison Co derived 22% of its new load from industrial cooking accounts.

As can be seen from the results of the latest Hotpoint survey, commercial cooking load is getting bigger every year. It is one which is going to play an important role in utility revenues in the future.

A 22% dollar increase in the food and restaurant business has been predicted for the next 10 years by Dr Joseph W. Thompson, director of the Michigan State University School of Hotel Restaurant and Institutional Management.

Utilities today are receiving 16.90 kw of cooking load per commercial cooking customer. This should, however, be closer to 60 to 70 kw, experts say. With an increase in the use of heavy-duty equipment, backed by aggressive utility promotion, this figure can be reached.

James T. Coatsworth, commercial director of Edison Electric Institute, reported recently that 25 years ago lighting represented about 75% of the total commercial load. Today, it represents about 50%. Commercial cooking, along with air conditioning, has made up some of that difference.

"Intensive promotion of commercial electric cooking has been paying off handsomely in new load and revenue to dozens of utility companies," he said.

Utilities in the Hotpoint survey have shown how some of this promotion can be used effectively and the results that can be obtained.

Load Analysis—1959

	1959	1958
New Construction 308,236 kw	67.6%	58%
Remodeling Replacement Etc. 147,735 kw	32.4%	42%

Market Analysis—1959

Restaurants	212,938 kw	46.7% of market
Hotels, motels	28,726	6.3% " "
Schools	86,634	19.0% " "
Hospitals	31,918	7.0% " "
Industrial	32,374	7.1% " "
Miscellaneous	63,381	13.9% " "
	455,971 kw	100.0% of market

Modern asphalt plant, comparing costs with oil-fired unit, finds...

Electric Heat Cuts Overall Costs, Saves Labor

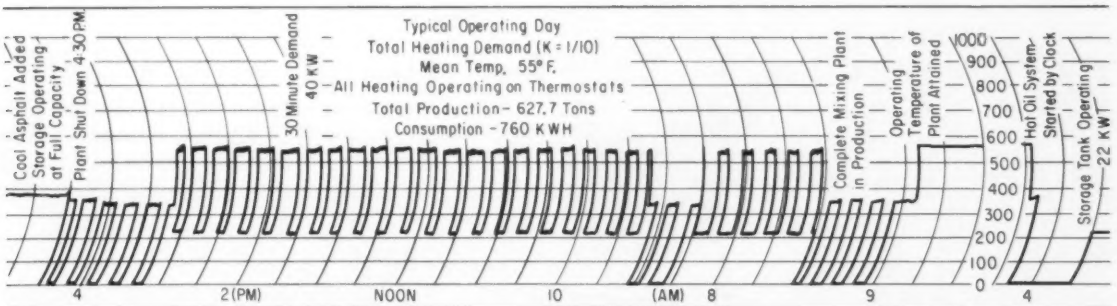
J. B. BARNES, Industrial Power Representative, Baltimore Gas & Electric Co., Baltimore, Md.

Greater working efficiency, a 40% saving in labor, lower overall operating cost, and the convenience of fully automatic operation are some of the benefits that George D. Fox & Co., Inc., has gained by heating asphalt electrically in its new plant near Fallston, Md. In addition, plant investment was reduced approximately 30% and construction was so simplified that six men completed the plant in 21 days.

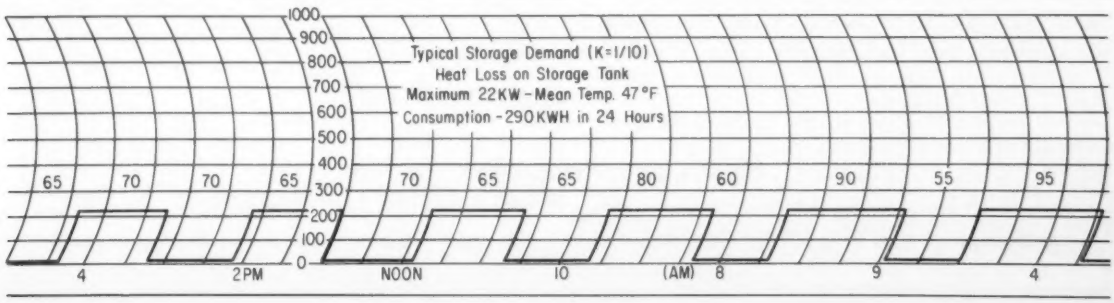
Based on his long experience with all methods of asphalt heating, President George D. Fox is convinced that "Electric heat is superior in all respects." This conviction is supported by direct comparison with an older Fox plant, of the same capacity, equipped with an oil-fired boiler for heating and mixing operations.

The old plant requires an operating force of eight men and a night attendant to care for the boilers. With the safe, fully automatic electric heat, the new plant needs only five men and no night workers.

Total connected load at the Fallston plant is 261 kw. A 40-kw thermostatically controlled tubular heater assembly maintains 300°F. in the



CHARTS SHOW TYPICAL HEATING demands for normal operating day (above) and storage period (below). Demands of 60 to 75 kw are recorded during 1.5-hr heat-up from 4:30 A.M. to 6:00. For rest of day, total heating demand is below 40 kw



15,000-gal insulated storage tank. The jacketed pipe line, asphalt pump, weigh bucket, and mixer are kept at desired temperature by a 36-kw hot oil heater, controlled by a thermostat and a 7-day calendar clock. This clock energizes the oil circulating pump and heater each working day at 4:30 A.M. By 6:00 A.M. all plant components have reached operating temperature. Demands of 60 to 75 kw are recorded during this 1.5-hr heat-up, but when production starts 30-minute demands for total heating requirement never exceed 40 kw for the rest of the working day.

Heat-up period for the oil-fired plant was 2.5 hr. Losses in transfer oil are about 18 gal per year in the new plant, as against 200 gal for the old installation.

Detailed records of operations at this plant during 1957 and 1958 substantiate operating data shown in the accompanying tabulation. According to Fox this data accurately represents average operating conditions for a plant of this type and capacity.

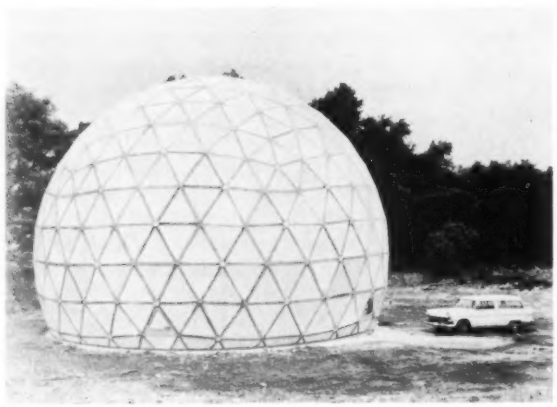
FIFTEEN DAY ANALYSIS OF OPERATIONS

Consumption, Kwhr

Date 1957	Black Top, Tons	Lt. & Pr. Only 185 kw Conn	*Storage 40 kw Conn	**Hot Oil System 36 kw Conn	Total Heating
9/19	604.15	1,080	370	275	645
9/20	482.95	890	385	220	605
9/21	Saturday	0	†520	†35	555
9/22	Sunday	0	324	0	324
9/23	607.80	1,090	320	290	610
9/24	103.30	340	650	205	855
9/25	746.30	1,320	375	380	755
9/26	726.75	1,270	400	290	690
9/27	639.55	1,130	505	220	725
9/28	Saturday	0	340	0	340
9/29	Sunday	0	290	0	290
9/30	363.35	697	420	225	645
10/1	627.70	1,120	420	340	760
10/2	429.50	830	410	250	660
10/3	175.55	450	460	180	640
TOTAL	5,506.90	10,217	6,189	2,910	9,099
Daily Av.	367.13	681	413	194	607
KWH/Ton Black Top		1.855	1.123	0.528	1.651

Total Billing Demand—Lt. and Pr., 113 kw; heat, 40 kw
Storage maintained at 300 F. 24 hr/day; Circulating asphalt, at 300 F. in production hours only
Plant capacity—3,000± per batch; average outdoor temperature 58°F.
*Approx. 4" of Rock Wool
**Approx. 2" of Rock Wool on pipes.
†Cool asphalt pumped from tank truck to storage tank, using hot oil heater to heat pipes.

Electric Heat Key to Dew Line Dome Production



FIBRE GLASS SEGMENTS used in self-supporting radar domes are cured by regular heat from four 12-kw immersion units

V. C. SCHUMACHER, Industrial Power Engineer, Ohio Power Company, Canton, Ohio

Accurate temperature control makes electric heat a vital tool in the production of fibre glass radar domes used by the Air Force on the Arctic distant early warning line and other radar posts. The domes are 47 ft. high, with a 55-ft. diameter. Supported entirely by their own skin, they require no internal supports. At Old King Cole, in Louisville, Ohio, four 12-kw immersion heaters are used to cure the diamond shaped pieces which make the domes. Installed in a 1,000-gallon tank of heat transfer oil, they maintain the oil at a constant 300 F. The oil is then pumped to the curing forms. The tank is insulated with 4 inches of fibre glass. The electric installation requires less maintenance than other methods, and has considerably less fire hazard.

What's Your Production Problem?

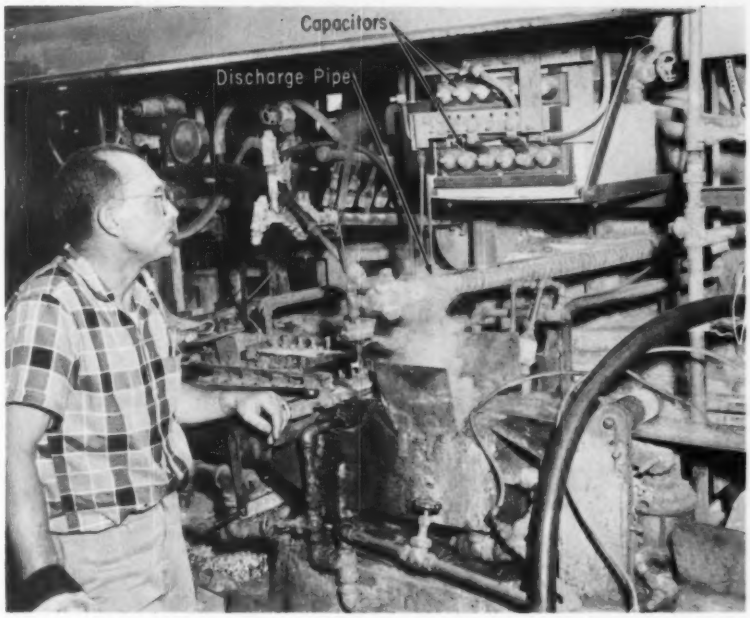
If you have problems in lighting, drying, casting, forging, painting, or materials handling, consult your local power company. Let their experienced specialists show you how to cut costs with electric power.

Induction Heat Improves Metal Coating Process

GEORGE H. MAIER, Electric Heating Engineer, Dayton Power & Light Co., Dayton, Ohio

A simple induction heating installation solved a difficult metal coating problem at a large industrial firm in Ohio. Wrapped around the heating pot discharge pipe, the installation eliminates heat loss between the pot and the dip tank.

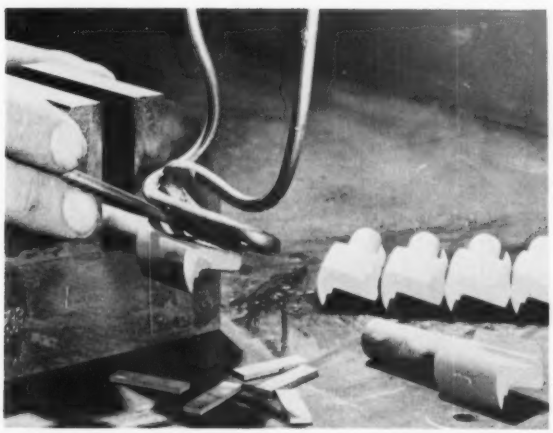
With only a 10-kw load on the 30-kw, 10-kc generator, the coil raises the molten metal temperature almost 400 F, twice the expected rise. As a result, the company can lower the temperature of their gas-fired melting pot, with an ensuing increase in pot life and reduction in fuel costs. Because of the accurate temperature control, the grain structure obtained is superior to any previous coating process.



INDUCTION HEATING COIL wrapped around heating pot discharge pipe, cuts heat loss between pot and dip tank. Grain is better, operating costs lower

The induction heater was selected after pipe insulation, gas torches, and a gas heater had failed to provide the 1,000 to 1,100 F tank temperature needed for proper grain. Feasibility of strip and tubular metal heaters was also investigated. Two capacitors, totalling 30 kvar, were installed above the pipe to correct the power factor of the installation to 80%.

New Heater Boosts Tool Brazing Capacity 30%



CARBIDE TIP IS BRAZED to one-inch router bit without oxidation. Copper tubing, 3/16-in. in diam, hits full heat in 25 sec

An electronic induction heater that replaces a manual brazing operation has eliminated rejects and reworking problems at the Virginia Machine Tool Co., in Bassett, Va. Used to braze carbide tips on custom-made router bits and saws for woodworking tools, the heater has increased production capacity 30% and greatly improved product quality. It is also used to anneal the shanks of slotted moulder knives.

The complete brazing cycle takes only 45 seconds: 25 to bring the copper tubing up to maximum temperature; 10 at full heat, and 10 for cooling. A variable coupling output transformer allows the user to match the heater to the output coil instead of designing and forming a coil to match the fixed outputs of the heater.

In the past, tips were brazed on with a small oxyacetylene torch, fitted with different sized nozzles. Production quality was uneven because it was difficult to get a uniform temperature over the entire working area. Different coefficients of expansion in the steel and carbide caused the tips to crack.

Cost-Cutting Ideas for Industry

Conveyorized electric oven...

speeds table production...

Cuts Processing Time From Hours To Minutes

R. L. SPENCER, Power Sales Engineer, Consumers Power Co., Battle Creek, Michigan

A conveyorized, 96 kw, radiant electric oven is speeding the process of gluing panelite to aluminum frames in the production of occasional tables at the Woodlin Metal Products Co. plant in Marshall, Michigan. The former process required three hours under pressure and about 69 hours of idle drying time, a total of 72 hours.

Now the panelite top and aluminum frame pass through the oven in three minutes, cool approximately 10 minutes, for handling, and pass through pressure rolls to complete the first assembly in 15 minutes. Subsequent tables are produced at a rate of 600 to 800 per eight-hour day. This production is based on 18-inch by 40-inch tables, but sections as large as 30-inches by 60-inches can be accommodated.

As important as the time savings is the elimination of "in-production" storage for 69 hours which was required by the old method. By eliminating the stacking of approximately 2,000 tables for drying, the available area for production is increased.

The radiant oven is 3 ft by 24 ft (36 ft to the conveyor ends). It operates at approximately 160 F. The pressure rolls weigh approximately 200 lb. each but the exact rolling pressure is probably less than this.

Keeps Aquatic Customers Cozy With Electric Heat

JAMES R. WARK, Power Sales Engineer, Indinapolis Power & Light Co., Indianapolis, Indiana

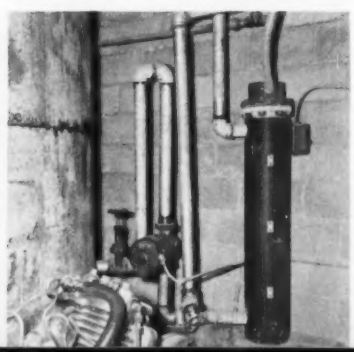
A 30-kw electric circulation water heater installed by Meridian Marine Mart of Indianapolis provides 90F water temperature for personal comfort in a skin diving tank where prospective customers test skin diving equipment such as masks, air hoses, tanks, flippers. The tank is 10 ft in diameter and 11 ft deep. Water level is maintained at 10 ft.

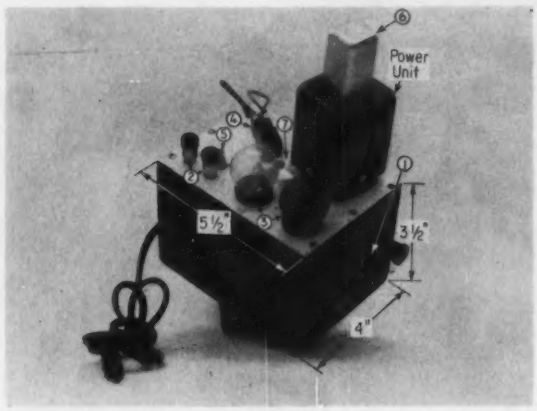
The water heater was installed in the basement adjacent to the tank. Colder water from the bottom of the tank is fed through the circulation water heater by a pump driven by a ¼-hp motor. The heated water is returned to the tank inlet just below the top of the water.

This equipment brings the water to the preselected temperature set on the thermostat and maintains the temperature throughout the tank. The water heating system was easy to install, low in first cost, requires practically no maintenance and the operating cost is low.

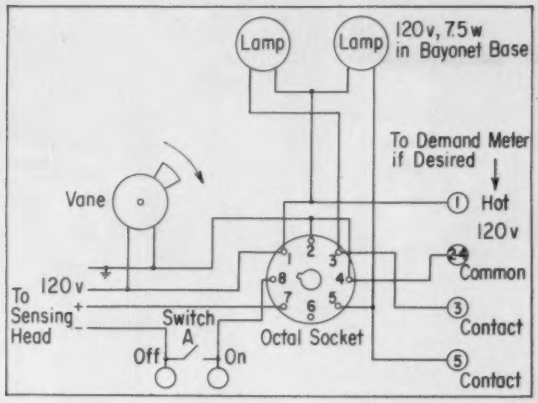
Skin divers testing new equipment are kept warm by...

30-kw electric water heater





SENSING HEAD and external relay of contactor may be checked with test device. Setup includes (1) terminals to demand meter, (2) ammeter terminals, (3) indicating lamps, (4) sensing head being tested, (5) ammeter switch, (6) CV relay under test, (7) vane. During testing, switch A is opened to measure current flow in sensing head



Test Device Checks Meter Contactor

J. W. HURLEY, Meterman A, Wheeling Electric Co, Wheeling, W. Va.

A testing device developed for a watthour meter type CV contactor permits direct checking of both of its main components. The testing device permits field testing to determine whether trouble is in the sensing head or the transistorized power unit and relay of the contactor.

The type CV contactor gives electrical impulses proportional to kw load. These impulses may be recorded on any type of printing demand meter through an external relay and auxiliary contacts.

With the device, the sensing head of the contactor can be checked for actual operating current and voltage. Lamps flashing alternately provide a positive visual check that the CV relay contacts are functioning. Each flash simulates an impulse produced by a three-wire contact device. Any printing type of impulse-operated demand meter also can be checked with this testing unit.

Components for the unit, available in any radio parts store, were bought for about $4. This does not include the constant-speed motor and gears that drive the vane of the contactor. For this, the motor from a scrapped Type G-9 demand meter is used. Particular values of demand can be simulated by proper choice of gear ratios for the motor.

Carts Speed Order Filling

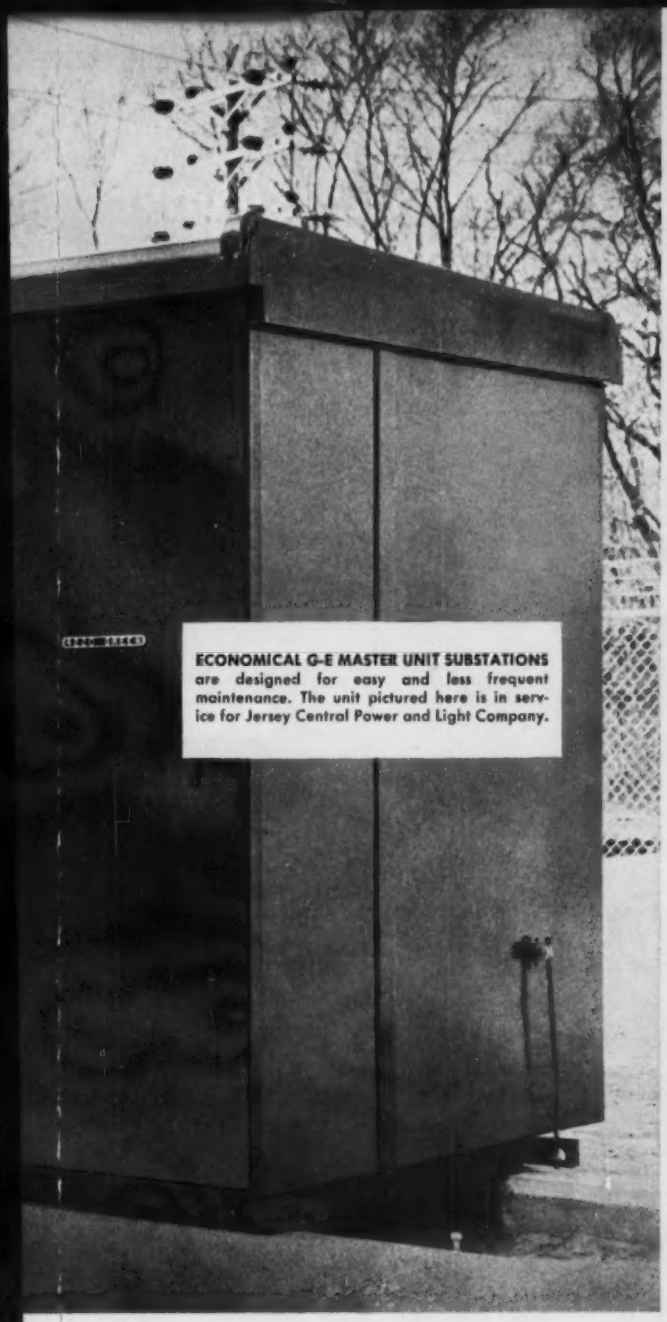
Orders for material are filled easily in Oklahoma Gas & Electric Co's new storeroom by a clerk who pushes a four-wheeled cart along in front of material bins. Bins are arranged for convenience in both storing and removing materials. Fluorescent lighting, designed especially for lighting material bins, makes it easier to fill material orders.

Three sizes of carts are used, depending on the order. The medium sized cart illustrated takes care of many requirements. A smaller cart is used when the order is small and materials to be handled are small. For large orders and for larger items of material, the largest cart is used.

(*More Methods on page* 92)

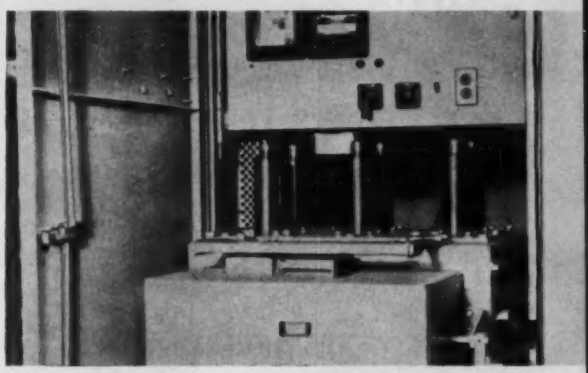
if you need **SIMPLIFIED MAINTENANCE** *you need...*

ECONOMICAL General Electric Master Unit Substations

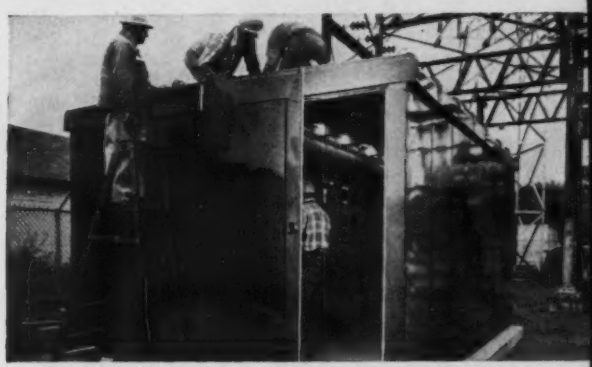


ECONOMICAL G-E MASTER UNIT SUBSTATIONS are designed for easy and less frequent maintenance. The unit pictured here is in service for Jersey Central Power and Light Company.

TRANSFORMER MAINTENANCE is simplified by recessing indicators and making accessories easy to get at even when the equipment is energized.



GENERAL ELECTRIC VERTICAL LIFT Metal-clad switchgear is safer. You can see when the primary disconnects are parted. Maintenance can be performed by one man.



INDOOR MAINTENANCE of outdoor gear is possible with General Electric's protected aisle arrangement. This aisle is wide enough for two breakers to pass side by side within the structure.

After initial equipment cost, routine maintenance and inspection is the largest single substation operating expense. That's why General Electric transformers and metal-clad switchgear are designed and coordinated to afford top maintenance economy.

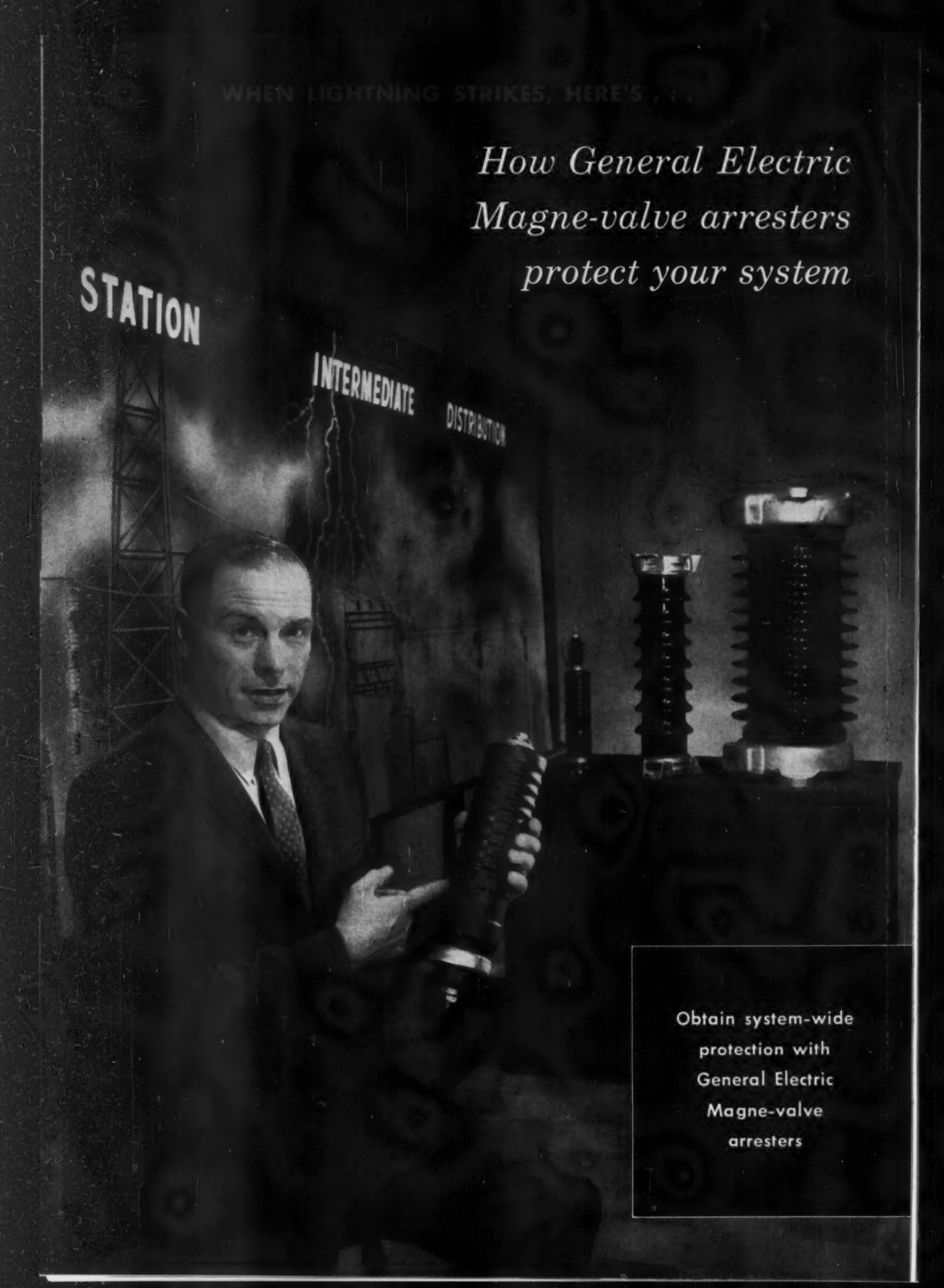
General Electric "Certified Full Value" transformers, for example, are ruggedly constructed and carefully painted to minimize maintenance. "Control center" accessory and indicator location speeds maintenance, and new load-tap-changer design cuts both noise and wear.

In addition, Vertical Lift Metal-clad switchgear maintenance—on both indoor and outdoor designs—has become a one man job. With instruments and relays now located conveniently above the breaker, routine maintenance can be performed quickly, easily.

Consider these maintenance benefits when planning for future system needs. For more information, contact your nearest General Electric Apparatus Sales Office or write for bulletin GEA-3800D, General Electric Company, Schenectady 5, New York. 512-35

Progress Is Our Most Important Product

GENERAL ELECTRIC


WHEN LIGHTNING STRIKES, HERE'S . . .
How General Electric
Magne-valve arresters
protect your system
STATION
INTERMEDIATE
DISTRIBUTION
Obtain system-wide
protection with
General Electric
Magne-valve
arresters

General Electric Magne-valve arresters effectively discharge lightning and switching surge currents and quickly interrupt power follow-current—without service outage. The Magne-valve principle goes into action after lightning discharge. The follow-current first creates a magnetic field in the arrester gap . . . second, it forces rapid movement, stretching and cooling of the follow-current arc. The arc is completely extinguished at the first current zero. This duty-cycle can be repeated immediately—again and again.

Unique, simple and efficient, the Magne-valve principle gives versatile protection in distribution, intermediate and station applications.

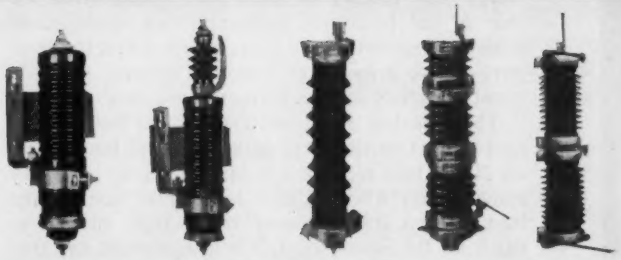
For more information on why Magne-valve offers the best system protection, see your General Electric Sales Engineer. For a free booklet of certified laboratory design tests, fill in the coupon below.

** Combines magnetic gap action with valve action of Thyrite, Registered Trade-mark of General Electric Co.*

Progress Is Our Most Important Product

Don Herbert explains General Electric's Magne-valve principle for superior lightning protection.

GENERAL ELECTRIC



Distribution, direct-connected and externally gapped 3-20 KV

Intermediate 3-121 KV

Station-class Form 3K 60-276 KV, Form 1H 3-121 KV

Section A488-1, General Electric Company, Schenectady, N. Y.

Please send me a copy of G.E.'s certified test data for the following magne-valve arresters.

- ☐ Distribution (GET-3035)
- ☐ Intermediate, Form 2H (GET-3036)
- ☐ Station class, Form 1H (GET-3037)
- ☐ Station class, (EHV) Form 3K (GET-3033)

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

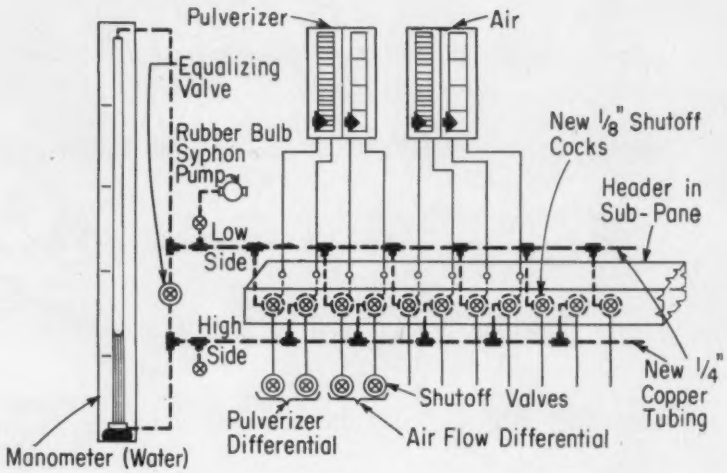
Check Draft Gages in 50% Less Time

ERNEST B. STOELTING, Instrument Maintenance Man A, Clifty Creek Plant, Indiana-Kentucky Electric Corp, Madison, Ind.

New valves, piping and a manometer are saving 50% of the time formerly spent re-calibrating or checking for leaks in differential gages that measure pulverizer coal level and air flow. With these convenient facilities, more checks are made and pulverizers can be kept operating more efficiently. The new arrangement permits the checking of differential gages in service and without disturbing pulverizer feeder controllers.

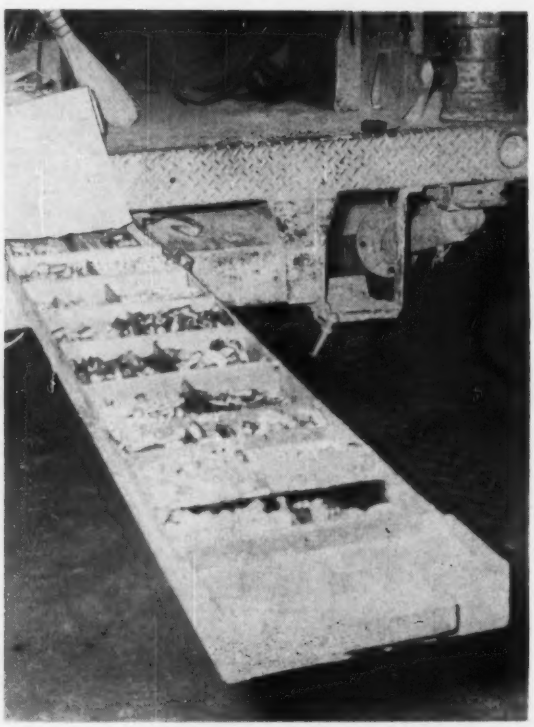
To check a gage in the past, it was necessary to remove pipe plugs or disconnect tubing connections at the junction header in the pulverizer sub-panel. Then a manometer had to be installed across the connections to the differential gages. A remote source of air also was needed.

To revise the original setup, the ⅛-in. pipe plugs in the lines



at the junction header were replaced with ⅛-in. shut-off cocks or valves. A manifold of copper tubing was extended to a manometer. The entire setup was installed on Unit 1 for $75, based on a 7-pulverizer unit, but excluding the manometer's cost.

The test manometer is cut in merely by opening the appropriate two shut-off cocks at the junction header, high side and low side, for the draft gage to be checked. By closing the valves ahead of the junction header, it is possible to check for leaks, such as a leaking diaphragm in a differential gage. Similar installations are being made on the other five units at Clifty Creek.



One Tray Stores All Line Connectors

W. H. HONAKER, Line and Station Supervisor,
M. A. WHITE, Line Foreman, Appalachian Power Co, Logan, W. Va.

A 7-ft compartmented tray for line trucks provides an ideal place to keep all of the small compression connectors, fittings, taps, etc, used in overhead line work. The space under the truck bed, originally for digging bars and tools, holds the tray.

The tray is easy to reach and handle from the rear of the truck. If necessary, this space could accommodate two trays. It is estimated that the trays save a line crew $225 annually in time formerly spent searching for the correct connectors.

The tray has ⅛-in. steel sides and bottom and spot-welded partitions to make 24 small bins. Overall dimensions are 7 ft x 3 in. x 13½ in. A heavy canvas cover is nailed to a 1-in. wood block at the back of the tray. Drawer stops, high enough to catch on the lip of the tail board, prevent the tray from being pulled or jarred all the way out. Trays were fabricated locally at $31 each.

OIL ▶ **Heavy fuel oil prices edged up 10 to 15¢ a barrel** at Gulf Coast refineries in recent weeks, reflecting a tight supply situation.

FUEL ▶ **Electric utilities burned a record quantity of oil** in January, 10.62 million barrels. This is an increase of 6.5% above the previous high set in Jan. 1958. Coal use by utilities dropped in January by 0.4% from the previous January, but natural gas consumption climbed about 13.6%. For the longer term, recent forecasts indicated gas will gain about 9% a year and coal about 7% a year through 1965 (EW, April 11, p 105).

COAL ▶ **TVA recently announced award of contracts** calling for 2,105,150 tons of coal valued at $5,902,164. The tonnage is divided among four producing fields: Southern Illinois, West Kentucky, East Tennessee, and Southeast Tennessee.

PURCHASING STUDY ▶ **New study titled "Buying and Selling in an Industrial Market"** issued by General Electric Co, offers this guide for salesmen:

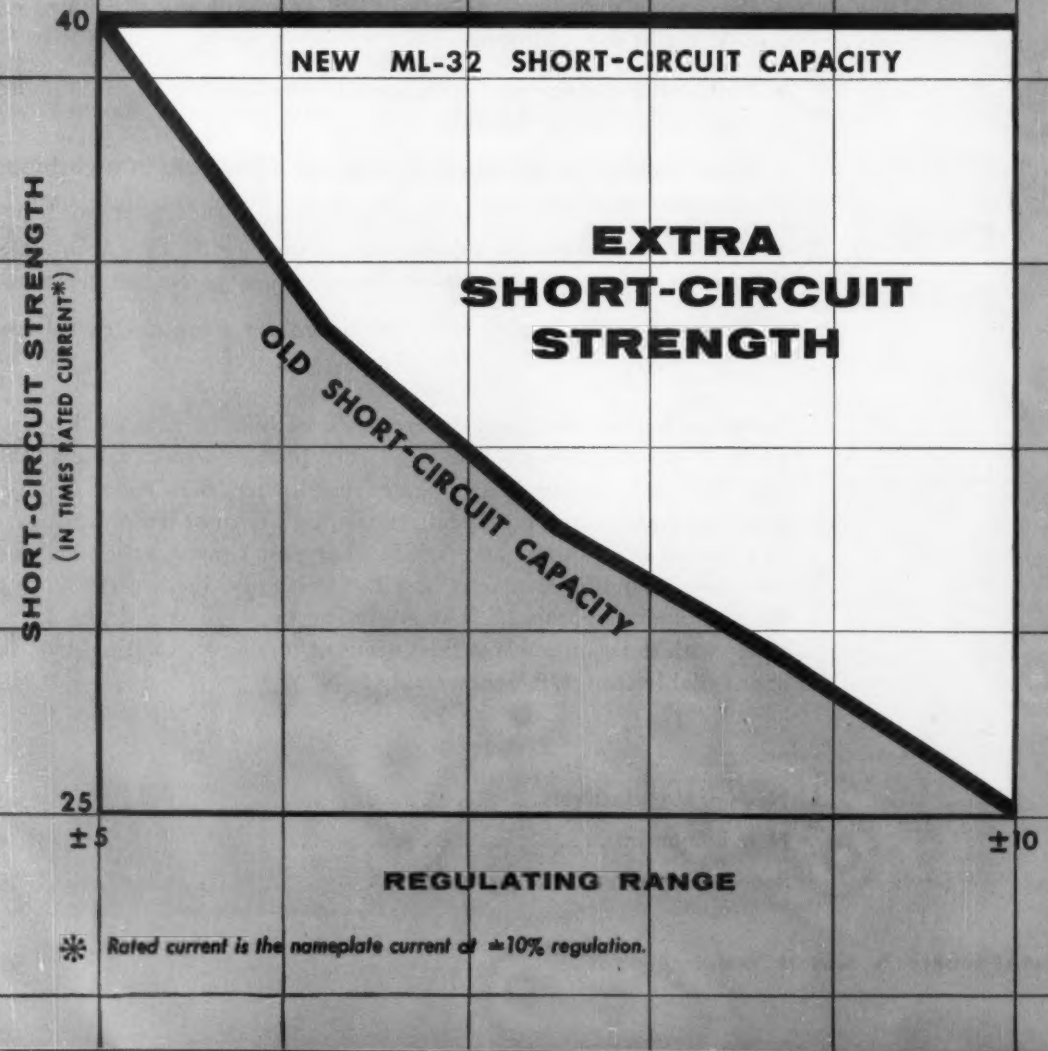
- **Purchasing management buys utility or usefulness**—no more, no less. Value-in-use is supreme.
- **Purchasing management men want to be objective** and deliberate in expressing their preferences.
- **Their preferences are based on marginal differences** in usefulness. To evaluate is to compare. All are useful. Some are more useful.
- **They will instinctively prefer the product** which they think has the greatest degree of added usefulness when the prices are the same.
- **They will resist buying** what they consider marginal usefulness at a significant additional price in exchange.

Commenting on "marginal differences" the booklet says, "All transformers will transform and have gaskets, but some have gaskets that will seal a transformer much tighter and longer than others. Therefore, one gasket, a marginal feature, is more useful or has more value-in-use than some other gaskets. The economic consequence in terms of transformer life is, or may be vital. Certainly this is a matter for the customers' appraisal." The study, by D. K. Blake, deals exclusively with the economic considerations of buying and selling. Copies are available from GE, Schenectady 5, N. Y.

News of Manufacturers.....page 96
New Equipment.....page 104
Readers Service.....page 108

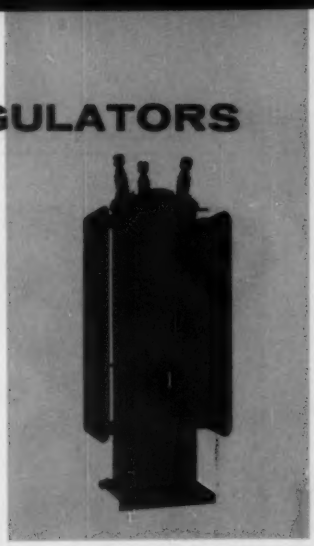
NOW STANDARD ON ALL GENERAL ELECTRIC

40 times rated current* short-



* *Rated current is the nameplate current at ±10% regulation.*

SINGLE-PHASE STEP VOLTAGE REGULATORS



circuit strength

New, stronger coil windings of General Electric single-phase ML-32 step voltage regulators will now withstand short-circuit currents of 40-times basic nameplate rating (the basic current rating at ±10% regulation) at all Load Bonus positions.

This increased short-circuit capacity is available for a duration of 0.8 seconds (48 cycles). With modern breakers, this time period gives ample leeway to detect a fault and de-energize the circuit.

Additional strength to resist high-current forces means increased protection against service outage under all current loads, plus even longer dependable life for already superior General Electric voltage regulators. Both of these important benefits are now available in G-E regulators at no increase in price.

These service extras are now possible because of the following G-E design improvements:

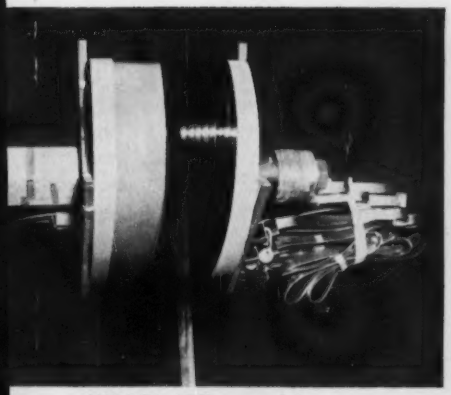
- **TIGHTER WINDINGS**—new coil winding process provides tighter, even coils; inherently stronger, better able to resist coil movement caused by short-circuit stresses.
- **SPECIAL INSULATION**—specially treated layer insulation forms a stronger winding-to-winding bond for finished coil. Additional protection added at points of most-severe stress to further resist coil shifting.
- **CONTROLLED DUCT SPACING**—cooling duct spacers are accurately positioned to hold windings firmly in place against radial forces during short circuits.
- **BALANCED WINDINGS**—coils are precisely aligned to resist destructive forces caused by short circuits.

This new high standard for voltage regulators is another dividend you receive from G-E research.

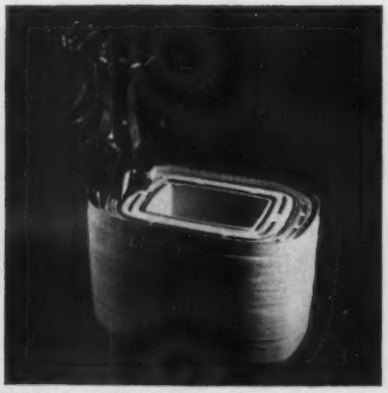
To learn more about all the reasons why G-E Voltage Regulators Cost Less on the Line, contact your nearby General Electric Apparatus Sales Office or Agent. Or write for Bulletin GED-3905, General Electric Company, Section 423-41, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC



RUGGED COIL wound by new process provides stronger resistance to forces caused by high short-circuit current.

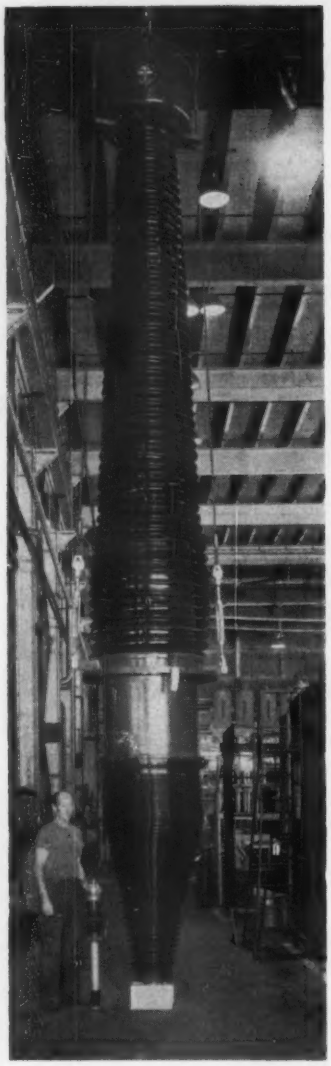


SPECIAL INSULATION strengthens coil by stronger winding-to-winding bond, resists movement caused by short-circuit currents.

EXTRA REGULATOR STRENGTH

(for a typical ML-32 100-ampere unit)

Regulating Range	Current Range	Former Short-circuit Capacity	NEW Short-circuit Capacity
±10%	100 amp (normal)	2500 amp	4000 amp
±8¾%	110 amp (load bonus)	2750 amp	4000 amp
±7½%	120 amp (load bonus)	3000 amp	4000 amp
±6¼%	135 amp (load bonus)	3375 amp	4000 amp
±5%	160 amp (load bonus)	4000 amp	4000 amp

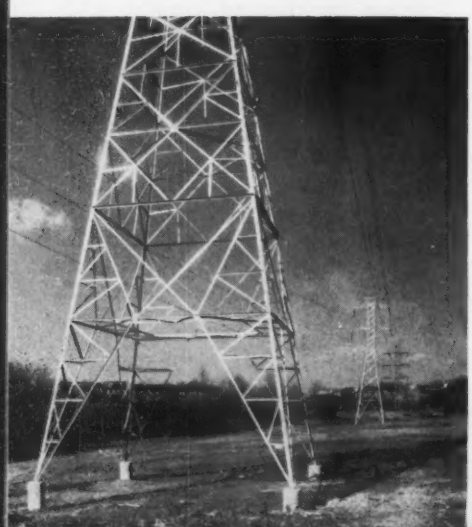


EHV Equipment Readied

Manufacturers supplying equipment for General Electric's Project EHV are preparing for initial operation of the system this summer.

This 650-kv bushing, 28-ft high (left), designed and made by GE, dwarfs the workman and the 23-kv bushing he is holding. The 10,000-lb unit, 2050-kv BIL, will be mounted with two similar bushings on a 40-Mva power transformer at the project's northern substation. Because of the bushing's size, part of the winding was done by the tube-rolling section.

Aluminum Co of America is testing 2.32-in.-dia expanded ACSR conductor at its physical testing laboratory in Massena, N. Y. Technician (below) holds conventional ACSR conductor next to a length of the massive new cable, held taut in the jaws of a tension-testing machine. The 2.32-in. cable will go into production shortly. Alcoa's role in the project is supplier of all conductors and accessories for the line, as well as an aluminum tower structure, substation structures, and lightning collector spires.



First Aluminum Tower Line Energized

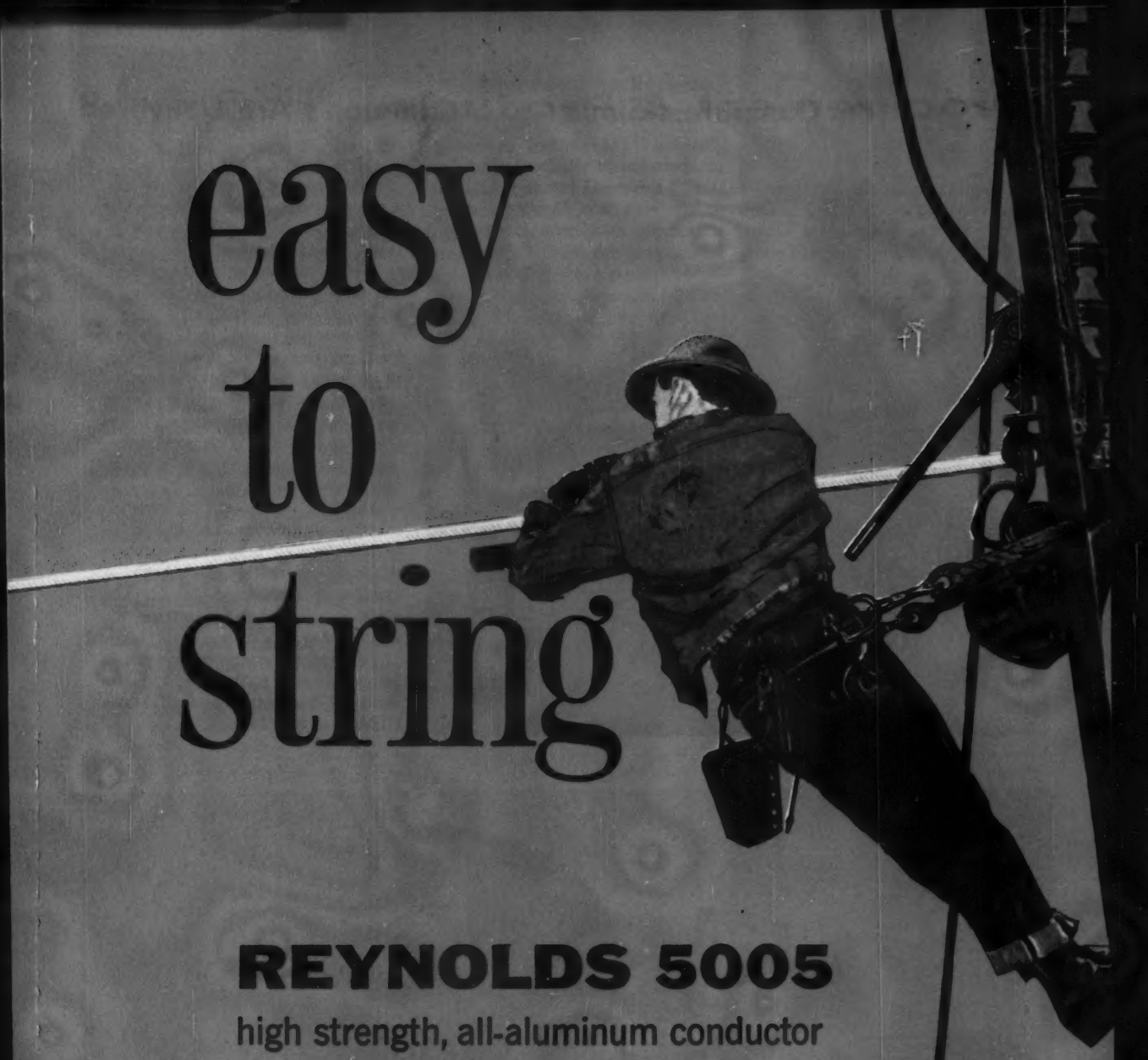
Philadelphia Electric has placed in service an eight-tower section of the transmission line linking its substation at Chichester, Pa., to its Eddystone generating station. (See tower base, left.) This is first tower line in the U.S. which employs all-aluminum structures, according to the manufacturer, Aluminum Co of America.

The eight towers are part of a group of 20 designed and fabricated by Alcoa for double-circuit, 220-kv service and comprise the initial mile of the utility's six-mile, 132-kv line between Chichester and Eddystone stations. The line was completed in late January and placed in service in February.

The remaining twelve aluminum towers, scheduled for mid-1960 completion, will be used on the line's other circuit, as part of 10,000,000-kw interconnection of utilities in Pennsylvania, Maryland, and New Jersey.

(*More News of Manufacturers on page* 98)

easy to string



REYNOLDS 5005

high strength, all-aluminum conductor

This all-aluminum conductor is easier to string, easier to handle from storage to installation because it's light in weight—has no steel core. It is also easier to splice and eliminates chance of galvanic corrosion. 5005 aluminum alloy resists rough treatment and abrasion. Economical, too—costs less than any other conductor with comparable properties. Minimum guaranteed conductivity 53.5%. Complete data available from your nearest Reynolds branch office, Reynolds Electrical Distributor, or *Reynolds Metals Company, P. O. Box 2346-EL, Richmond 18, Virginia.*

Watch Reynolds TV shows—"ADVENTURES IN PARADISE", "BOURBON STREET BEAT" and "ALL STAR GOLF"—ABC-TV

Two Daystrom Computers Similar to Sterlington's Are Delivered

Daystrom, Inc, has delivered two general-purpose computer operational information systems like this (below) to two southern electric utilities. A similar system has been in operation at the Sterlington station of Louisiana Power & Light for nearly two years. Daystrom reports it recently completed a six-month test, during which this system ran 99.75% of the time.

Both of the recently-delivered systems are completely transistorized, solid-state digital computer installations, guaranteed to be operationally available at least 99% of the time, 24 hours a day during a six-month test period.

When operational, these systems "will put the electric power utilities of the South far and away ahead of those in any other single region in daily use of computers," says Chalmer E. Jones, vice president—general manager of Daystrom's control systems division.

The first system will be installed as part of the new 182-Mw coal-fired electric generating station which Carolina Power & Light is erecting at Darlington, N. C. The plant is scheduled for service the first of May.

The second computer system is being delivered to the new 150-Mw Willow Glen station of Gulf States Utilities at St. Gabriel, La.

"King-size KYOVA," said the master, "does the job better and faster!"
SPECIFY KYOVA
KYOVA
For complete information, write Jack Dollenmaier, V.P.

to Southern Utilities

The systems provide human operators of a station with all data required for its most efficient operation, performing essential computations required for decision making upon this information. They monitor from 300 to 400 critical points throughout the stations and scan these points for temperatures, pressures, and flows at the rate of five points per sec.

Besides comparing information thus gleaned with pre-set limits stored in the computer's memory by station operators, the systems will do all essential arithmetic to come up with computed operational guides. Whenever variables are found to be running above or below pre-set limits, an audible or visual alarm will be sounded and the time and location of the trouble will be printed out. Once an hour the systems will print out the values of 220 variables at the Gulf States installation and 100 at the Carolina P&L installation.

U. S. Manufacturers Receive Smith Mountain Contracts

Contracts totaling $11½-million have been awarded to American manufacturers by American Electric Power Service Corp for major equipment for the proposed Smith Mountain combination hydroelectric project on the Roanoke River in Virginia. The development will be the largest combined river flow and pumped storage hydroelectric installation in the U.S.

Appalachian Power Co, major operating company of the American Electric Power System, will own and operate the project. AEP Service Corp provides management and technical services, including design, engineering and construction supervision, for AEP System companies.

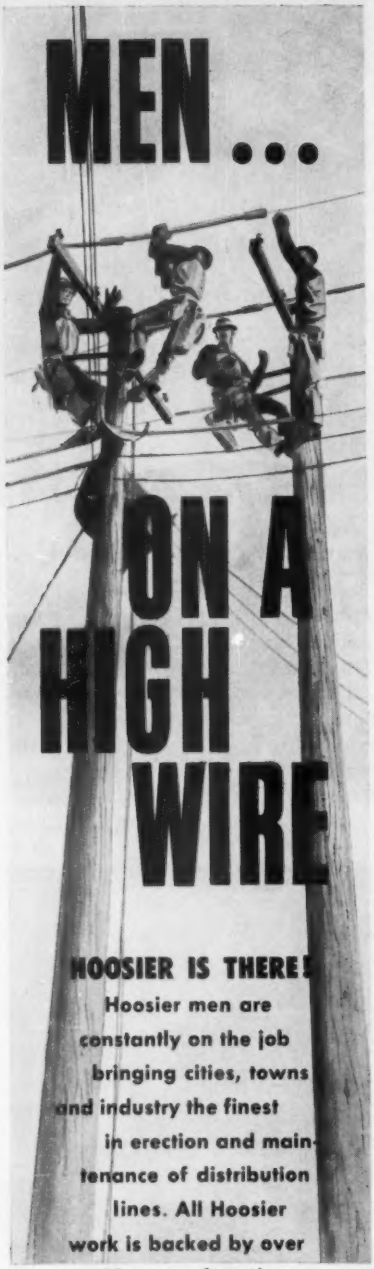
Philip Sporn, AEP Service Corp's president, says he is "particularly pleased that we were able to purchase all of the major equipment for this development from American industry. I would like to commend the manufacturers at this time

(*Continued on page* 100)

Enrico Fermi Pump Model . . .

is on display in Borg-Warner's exhibition hall in Chicago. Cross-section replica of liquid sodium pump at Enrico Fermi atomic power plant uses multi-colored lights and intricate electrical mechanisms to simulate flow of molten sodium through the pump.

ONLY KYOVA FIBER CONDUIT comes in
10-ft. lengths in all diameters
FOR KING-SIZE SAVINGS
10-ft. lengths of Kyova Fiber Conduit save a king's ransom in installation time and costs! Kyova on the job means fewer pieces to handle, fewer connections to make. Easy-to-handle Kyova performs royally, too.
It's light-weight, cuts with a handsaw and
seepage-safe joints are made by simply tapping couplings onto the perfectly tapered ends. The smooth, dust-free surface handles clean and fast. Available in 2, 3, 3½, 4, 4½, 5 and 6" diameters with accessories. 5-ft. lengths on request.
KYOVA FIBER PIPE COMPANY
IRONTON, OHIO


MEN...
ON A HIGH WIRE
HOOSIER IS THERE!
Hoosier men are constantly on the job bringing cities, towns and industry the finest in erection and maintenance of distribution lines. All Hoosier work is backed by over 40 years of continuous, dependable service to the electrical industry and its consumers.
HOOSIER
ENGINEERING CO.
1350 HOLLY AVE. • COLUMBUS 8, OHIO

for the cooperation which makes this possible."

Contracts for the two-dam project went to: Baldwin-Lima-Hamilton, for two 204,000-hp turbines for the upper dam and two 32,300-hp turbines for the lower dam; Allis-Chalmers, for two reversible pump-turbines and two motor-generators, rated 87,000 hp as turbines and 100,000 hp as motors, for the upper dam; General Electric, for two generators and nine 138-kv air blast breakers for upper dam; Elliott, for two generators for the lower dam; and Westinghouse, for six step-up transformers—four at the upper dam and two at the lower.

Seven Product Groups Form One NEMA Division

Electrical manufacturers in seven product categories within National Electrical Manufacturers Assn have formed the Industrial Electronics and Communications Equipment Div, seventh division set up under NEMA's plan to group together product sections with common marketing problems or other mutual interests.

Component sections are: Electrical Indicating Instrument, Power Rectifier Equipment, Power Semiconductor Component, Signalling Apparatus, Dry Battery, X-Ray and Telephone Equipment.

The division is headed by G. L. Nord, vice president of Schauer Mfg. Other members of the division's board are: R. L. Glover, general manager, technology, Union Carbide Consumer Products; W. H. Steinkamp, vice president, marketing, Daystrom—Weston Instruments Div; W. W. Martenis, general manager, semiconductor products div, Minneapolis-Honeywell Regulator; J. L. Taylor, executive vice president, Edwards Co; H. D. Lohman, sales manager, telephone equipment div, Western Electric; and W. J. Delaney, manager, x-ray and industrial electronics div, Westinghouse Electric.

Under consideration by board members are plans to expand the product scope of the division beyond the range of constituent sections in order to include many new and dramatic electrical items.

NEMA Consolidates Wire and Cable Activities

Wire and cable sections of National Electrical Manufacturers Assn will be consolidated into the Wire and Cable Div at the industry's annual three-day convention, starting April 25 at the Westchester Country Club, Rye, N. Y.

Those who will compose the new division are manufacturers of armored cable, magnet wire, paper power cable, building wire and cable, rubber, thermoplastic and varnished cambric cable, high temperature insulated wire, and flexible cords.

Organizational meeting and election of officers, attended by members of the division's board of directors, will be held April 25. The first division-wide session follows on the morning of April 26.

General chairman of the convention is C. W. Higbee, assistant general manager, electrical conductor div, Kaiser Aluminum & Chemical.

GE Announces Improved Step-Voltage Regulators

General Electric announces its Type ML32 single-phase step-voltage regulators are now built to withstand short-circuit forces of forty times the basic nameplate current ratings. There is no change in prices.

Five improvements in design and manufacture contribute to the regulators' increased strength: (1) Balanced windings, with coil ends and centers more precisely aligned to resist distortion by magnetic forces. (2) Specifically treated layer insulation, giving a stronger bond, with extra protection at points of stress. (3) Tighter coils—the conductor is scientifically wound to lie flat; use of most "modern" winding equipment increases resistance to winding movement from higher current stresses. (4) A stronger clamping structure with modern wedging methods resists axial forces. (5) Main tap switch has extra arc-resistant contact material. Reversing switch is silver-plated to reduce temperature rise. In larger ratings, a double-core design reduces the current duty on the switch.

(*More Procurement & Products p* 104)

If coal piles like this should ever be exhausted, American Industry would grind to a virtual halt — for coal still provides more "Go Power" than all other fuels combined... You can safely rely on Beacon as a dependable source to keep YOUR fuel supply always ahead of need. The 18,000,000 yearly tons we handle include a wide variety of coals with a complete range of properties in any quantity you require. A central control laboratory for combustion studies is supplemented by quality control laboratories at each of our larger mines. Preparation facilities are modern, teletype service connects our sales offices with major mines so that orders can be immediately placed, traced and expedited, and our trained Representatives understand combustion problems, and work their hardest to help you solve them.

BEACON COAL

EASTERN GAS AND FUEL ASSOCIATES

PITTSBURGH • BOSTON • CLEVELAND • DETROIT • NEW YORK
NORFOLK • PHILADELPHIA • SYRACUSE

For New England: New England Coal & Coke Co., For Export: Castner, Curran & Bullitt, Inc.

NOW! Fuses that...

Safely interrupt fault currents up to 200,000 amperes...

Limit fault current to very low values

Hold 500% load for minimum of ten seconds

Buss Low Peak fuses can completely revolutionize the protection of the entire electrical system.

Protect Mains, Feeders, Branch Circuits, Motors, Controllers, Switches—no matter whether the fault current is 1,000 amperes, 25,000, 100,000—or as high as 200,000 amperes.

Reduce stresses and prevent damage to Panel-boards, Switches, Motor Controllers—other circuit components—because let-thru fault currents are limited to exceptionally low values.

Prevent work stoppages, lights out, waste of time and money—because long time-lag keeps them from opening needlessly on motor starting currents or other harmless overloads.

Permit increasing interrupting capacity and current limitation on present system at minimum cost.

Before designing a new installation— or modernizing old installations—

GET ALL THE FACTS

Knowledge without action is of little value—but ACTION NOW may save you money—increase operating efficiency and reduce electrical hazards to a minimum.

BUSS LOW-PEAK fuses fit standard Switches and Panel-boards and are available in N.E.C. sizes from 15 to 600 amperes in both 250 and 600 volt ranges.

Write for BUSS LOW-PEAK Bulletin Now . . . or use coupon.

Bussmann Mfg. Division
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St. Louis 7, Mo.

BUSS
Low-Peak
FUSES

Bussmann Mfg. Division, McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.
Please send BUSS Low-Peak Fuse Bulletin LPS.

Name.....

Title.....

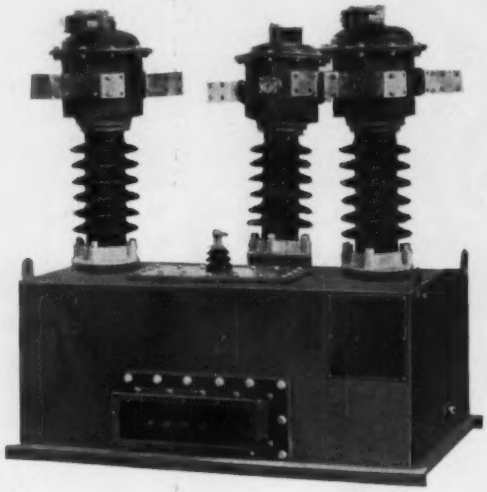
Company.....

Address.....City.....State.....

EW-400

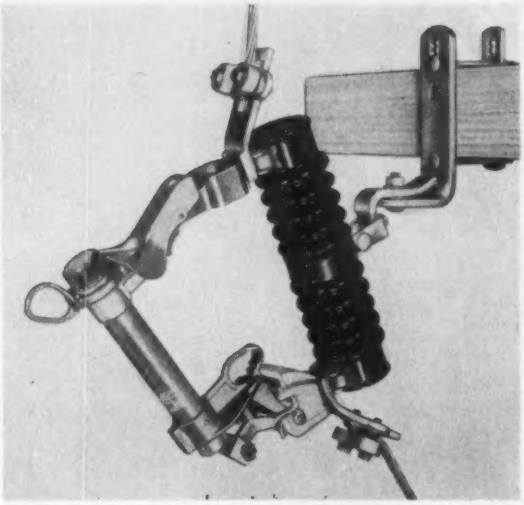
(For further information refer to Readers Service on page 108)

Metering Set . . .



. . . for 34.5 kv combines CT's and PT's for three phases in one tank. Type PCW is available for 3 or 4-wire systems. Transformers are oil immersed. The unit meets accuracy requirements for ASA and NEMA. PCW metering sets are made in all ratings through 72 kv, with double current ratios through 800 amp.

Standard Transformer Co, Warren, Ohio.

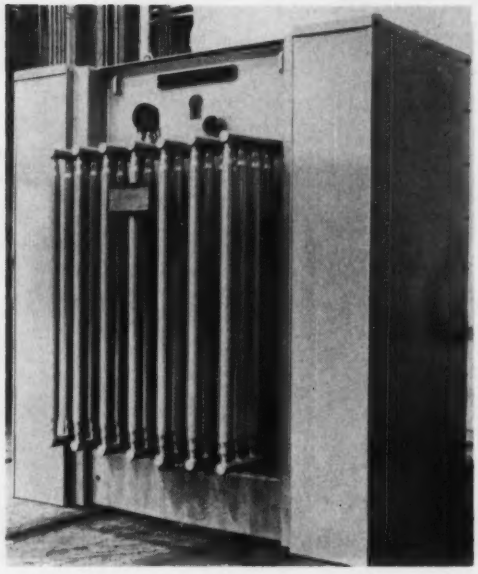


Open Cutouts . . .

. . . have 100 and 200-amp load ratings. Type HX 200-amp cutout has 12,000-amp interrupting capacity at 7.8 kv, 10,000-amp at 15 kv. The 100-amp cutout is furnished for voltages to 27 kv. A combination of expendable cap and small-bore cartridge aids effective interruption. A variety of insulator mountings is available.

James R. Kearney Corp, 4236 Clayton Ave, St. Louis 10, Mo.

Distribution Center Transformer . .



. . . has been redesigned with lighter weight and welded in place of bolted flanges. They are suitable as integral distribution center transformers or as load center unit substation transformers. Load ratings are 112½ to 2500 kva, oil or askarel-filled. The new design permits more thorough paint coverage in critical areas on the top and sides of the transformer tank.

General Electric Co, Schenectady 5, N. Y.

(*More New Equipment on page* 111)

ENJAY DELIVERS 1,000,000th LONG TON OF BUTYL!

PRODUCTION FACILITIES INCREASED TO MEET CONSTANTLY GROWING DEMAND

There have been many elastomers developed since the first commercial ton of Butyl was used in 1943, but no other rubber, synthetic or natural, offers so many outstanding properties for so many applications.

Plant expansion plans announced recently will increase butyl production capacity some 50 percent by 1961 and, at today's rate of consumption, the two million-ton mark will be reached within the next six or seven years. Two new additions to the butyl product line, Chlorobutyl and Butyl Latex, will soon be available in commercial quantities.

VERSATILE ENJAY BUTYL'S OUTSTANDING PROPERTIES MAKE IT SUPERIOR TO OTHER RUBBERS FOR MANY APPLICATIONS. SOME ADVANTAGES:

- **RESISTS TEAR AND ABRASION** ... used in the new and revolutionary all-butyl tire.
- **STANDS UP AT HIGH TEMPERATURE** ... used in steam hose and tire curing bladders
- **HAS EXCELLENT ELECTRICAL PROPERTIES** ... used in high voltage cable insulation
- **IS IMPERMEABLE TO GASES** ... used in virtually all rubber air-holding applications
- **HAS WIDE RANGE OF DYNAMIC PROPERTIES** ... used in over 100 applications on the modern automobile
- **DISPLAYS OUTSTANDING CHEMICAL RESISTANCE** ... used for the storage and shipment of many chemical and commodity products
- **WITHSTANDS EXPOSURE TO SUN AND WEATHER** ... used in irrigation pipe and roof coatings.

Want to find out fast, how versatile Butyl can improve your product? Call or write the nearest Enjay office.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

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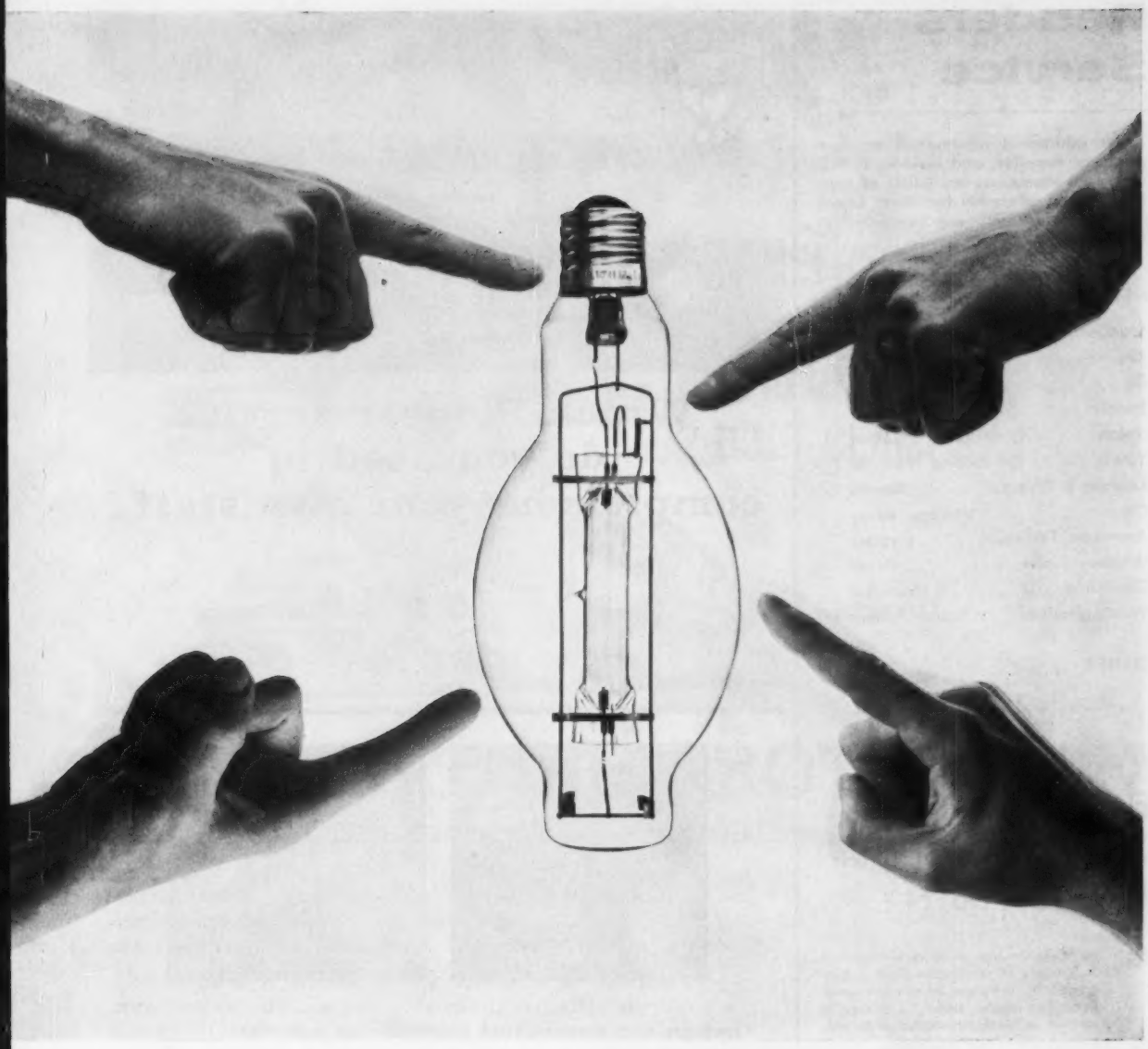
ENJAY® BUTYL

Mercury lamps may look alike

These Mercury lamps look alike and cost about the same, but one—the Westinghouse Lamp—will deliver more light initially and maintain this high light output longer. It is your most economical choice for industrial and commercial lighting and incorporates all 4 outstanding improvements listed below.

1. Lifeguard™ arc tube to improve lumen maintenance. Even after 10,000 hours of use, these lamps will still give 85% of their initial light output. *This means that 2½ years after you install Westinghouse Mercury Lamps, your plant or streets will have almost the same high level of light as when the lamps were new!*



. . . but four differences make one a better buy!

2. New design electrodes lock in the emission material and insure long life and easier starting.

3. Weather Duty™ construction. Special glass is resistant to thermal shock and corrosive fumes. Moisture, industrial fumes, even snow and rain can't harm these Westinghouse Mercury Lamps.

4. Hi-temp silicone cement holds bases tight for life . . . actually gets stronger as the lamps burn. No drop-outs. Westinghouse even date-codes its mercury lamps so you can check performance.

No matter what type or wattage of mercury lamps you use, you will get more value and light for your money—plus longer, trouble-free service—by specifying and insisting on Westinghouse Mercury Lamps. Westinghouse makes the most complete line of mercury lamps in the industry . . . 100 to 3000 watt sizes . . . in clear, color-corrected and reflector types. Contact your authorized Westinghouse lamp agent or nearest Westinghouse sales office.

YOU CAN BE SURE... IF IT'S **Westinghouse**

WESTINGHOUSE LAMP DIVISION, Westinghouse Electric Corporation, Bloomfield, N. J.

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Standard ..... Metering Set ☐
Kearney ..... Open Cutouts ☐
GE ..... Transformer ☐
Bendix ..... EDP System ☐
Holan ..... Positioning Cylinder ☐
Young ..... Boring Machine ☐
Robbins & Myers ..... Motors ☐
Onan ..... Voltage Relay ☐
American Television ..... Inverter ☐
Whitney Blake ..... Panel ☐
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Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

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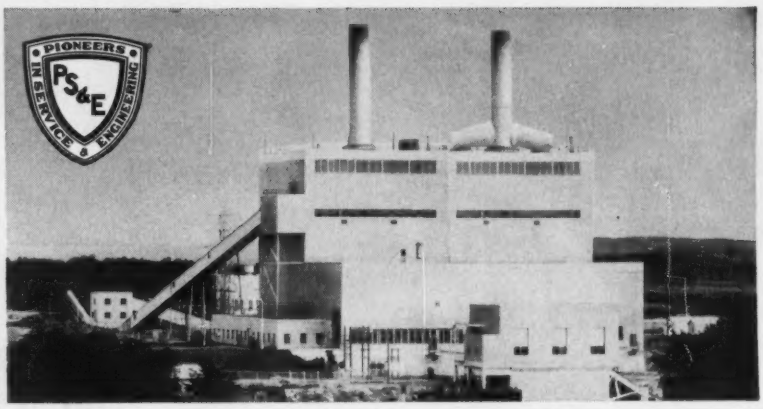
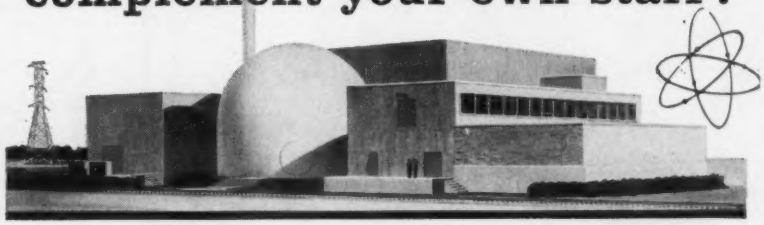
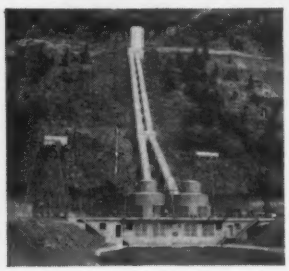
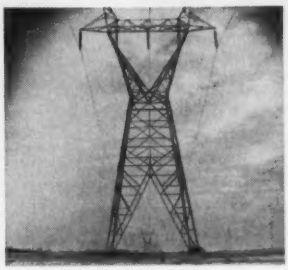
APRIL 18, 1960



Which Pioneer service do you need to complement your own staff?







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Pioneer offers its services in all phases of Federal, State and local utility regulation, including natural gas and electric rate matters, certificate proceedings, licensed project accounting requirements, depreciation studies for rate case and income tax purposes, cost allocations and special studies.

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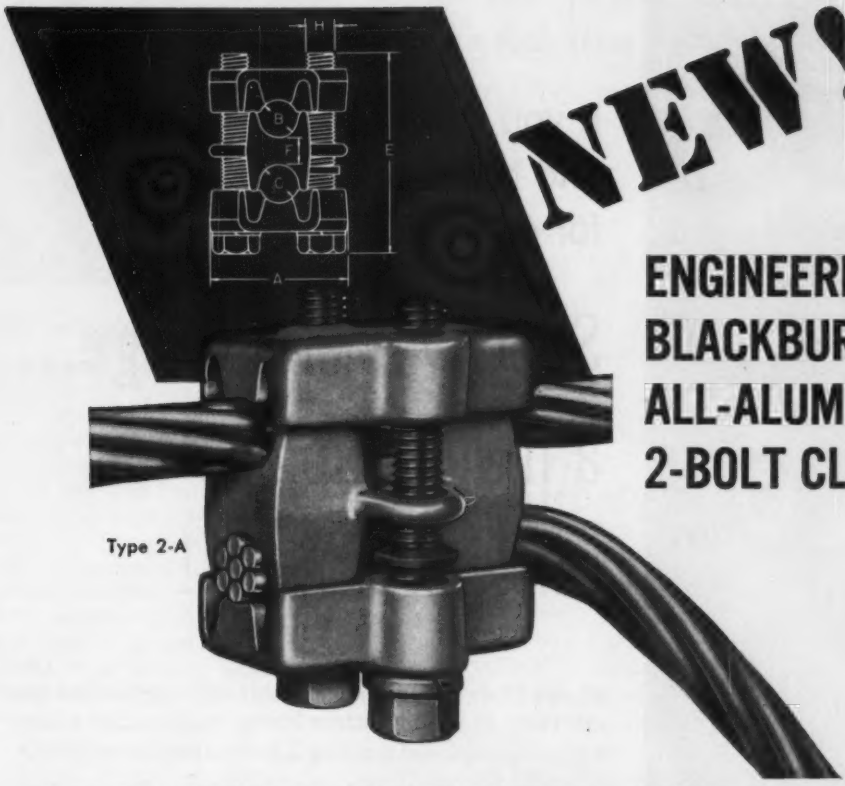

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Contact surfaces guarded by rainshield design of castings—inhibitor will not "wash out" even under driving wind and rain.

Condensation is drained off through ports in castings regardless of installation position—never allowed to accumulate around the conductors.

Designed with hot stick crews in mind.

Massive all-aluminum clamp—including hardware—may be used on aluminum or on copper conductors with inhibiting compound. Extra thick, highly conductive aluminum spacer separates dissimilar conductors for added corrosion protection.

Four clamps accommodate a wide range of wire sizes—main from 6 to 795 ACSR, tap from 8 to 397.5 ACSR. Write for samples and literature.

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If you need condenser and heat exchanger tubes for critical service...

Specify **Phelps Dodge**... a major supplier for nuclear projects!

Phelps Dodge condenser and heat exchanger tubes are currently in use in nuclear energy applications where highest quality and exacting specifications are essential.

Every Phelps Dodge tube intended for use in a nuclear project undergoes a series of severe tests to assure rigid conformance to the required specifications and ability to perform under the rigorous service conditions found in this highly specialized field. Testing facilities used by Phelps Dodge cover not only standard ASTM specifications but also include these special non-destructive tests:

- Eddy-current inspection
- Dye penetrant test
- Ultrasonic inspection

To keep pace with the steadily growing importance of the nuclear power field, Phelps Dodge will soon open one of the largest tube mills in the world at South Brunswick, N. J. This mill will have the most modern automatic tube fabricating machinery, the finest research laboratories and the most advanced testing equipment.

Inquiries regarding your condenser and heat exchanger tube needs, particularly those requiring Electronic and Penetrant Tests, are invited.

PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 PARK AVENUE, NEW YORK 22, N. Y.

EDP System . . .

. . . performs multiple tasks simultaneously by relegating operations to subordinate control buffer units. The central processor computes and supervises while control buffers record and look up data on magnetic tape, read punched records and print. The random access magnetic core memory holds up to eight modules of 4,096 words each. The G-20 system solves scientific and data processing problems.
Bendix Aviation Corp, 5630 Arbor Vitae, Los Angeles 45, Calif.

Positioning Cylinder . . .

. . . enables lateral spotting of earth borer 11 in. to the left and 29 in. to the right or curbside of the Holan 6800 derrick centerline. This reduces truck maneuvering, permits shallow angle parking, and makes boring next to poles easy. It is a working companion to the longitudinal positioning cylinder.
Holan Corp, 4100 W 150th St, Cleveland 35, Ohio.

(*More New Equipment on p* 112)

Harper produces over 100 alloys to "**thread the needle**" in meeting your specific corrosion-resistant needs

ANOTHER HARPER
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What alloy do you need? In what size and shape fastener? Harper maintains a stock of over 150,000,000 pieces in over 100 alloys to meet your requirements *quickly*. Alloying is an important part of Harper's completely integrated operation that includes elements, billets, and extruding to fabricating parts—assuring you of uniform high quality at lowest possible prices. Harper distributors everywhere maintain complete stocks for immediate delivery. See your Yellow Pages.

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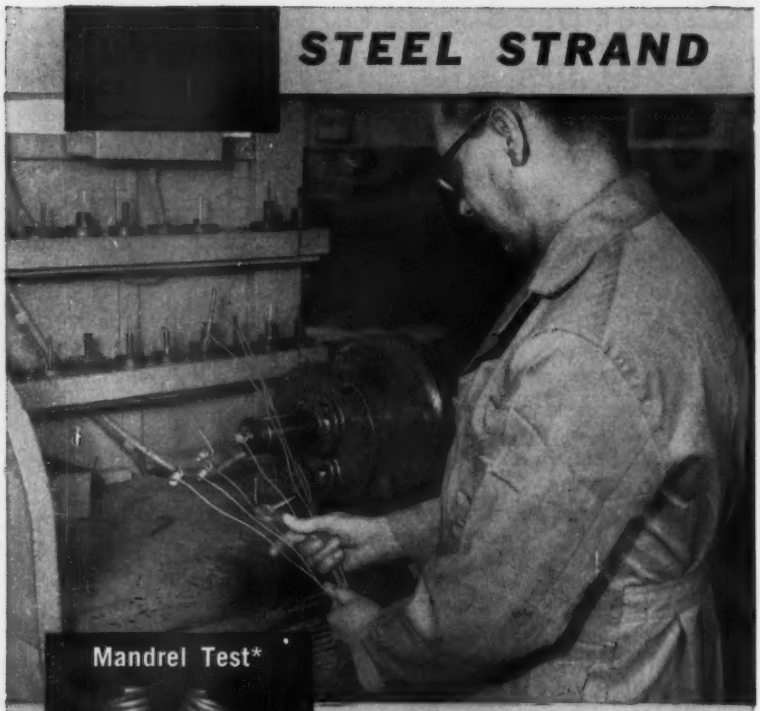
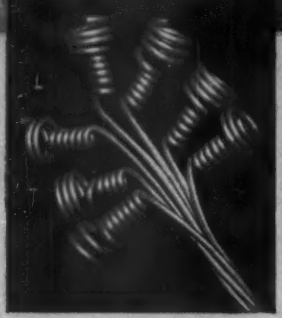
STEEL STRAND



Mandrel Test*



Checked and Double-Checked by Laboratory Technicians

Every coil of wire used in the manufacture of *Crapo* Galvanized Steel Strand is tested and approved by trained laboratory technicians. Samples from both ends of each individual coil are subjected to a series of prescribed tests before stranding. Then, the finished strand is re-checked to make certain that it conforms in every respect to established specifications and our own high quality standards.

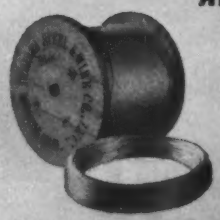
Thus you know when you specify *Crapo* Galvanized Strand that every precaution has been taken to assure maximum performance in the finished product.

Write for Free Booklet

"The Story Behind Crapo Galvanized Wire and Strand" illustrating and describing manufacturing techniques and testing procedures. Ask for Booklet B-59!

AVAILABLE IN 3 COATING WEIGHTS

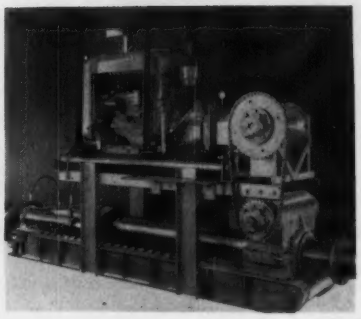
FOR GUYS, MESSENGER AND OVERHEAD-GROUND WIRE



Crapo Steel Strand is available in all standard sizes and grades and in Class A, B and C galvanized coatings. Class B coating is twice as heavy as Class A coating; Class C coating is three times as heavy.

*Determines ductility of wire and adherent quality of galvanizing.

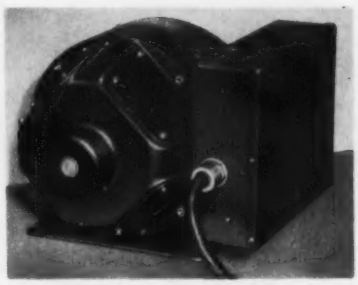
INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana



Boring Machine . . .

. . . bores and installs casing from 6 to 30-in. dia in one operation under streets or railroads. The 35-hp power unit is mounted integrally above the boring unit and can be removed easily and set on its own pipe-skid base. Drive is through a four-speed transmission with reverse. The unified under-road boring machine eliminates cribbing, caving and back-filling and does not interrupt traffic.

Young Engine Corp, Canton, Ohio.



Ac-Dc Motors . . .

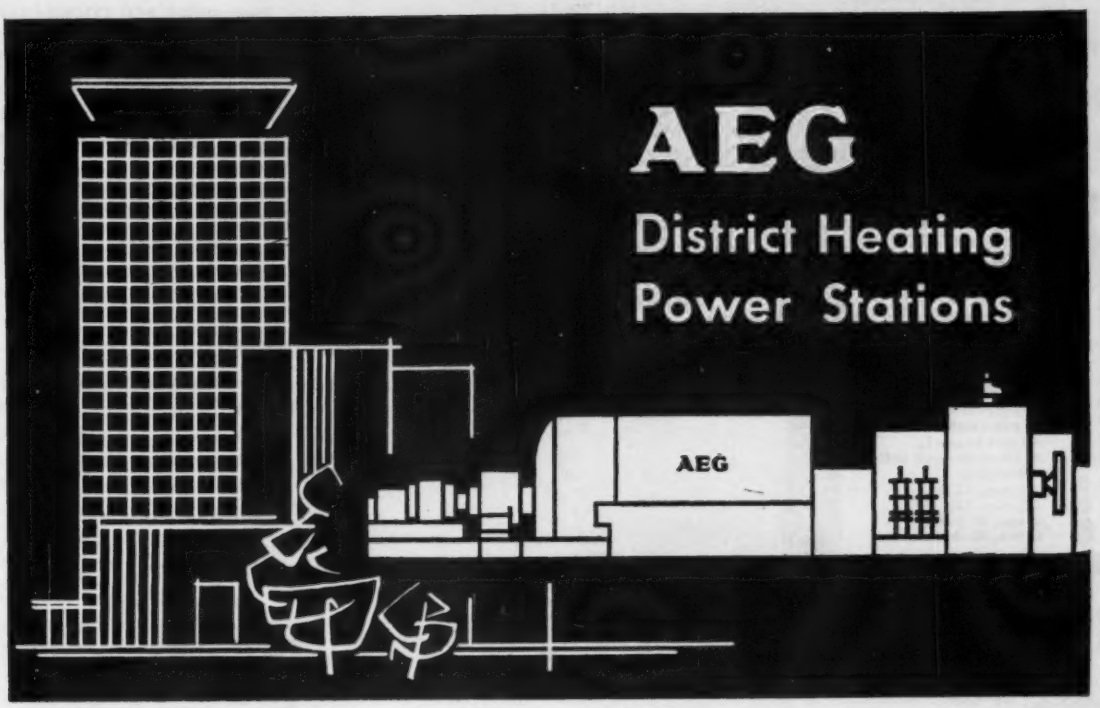
. . . in the integral horsepower range up to 7½ hp are designed for applications such as mobile field equipment in remote areas. Features include a silicon rectifier bridge input circuit which does not have to be reconnected for a change in type of current. Supply is 115 v for ac or dc, and the motors operate at 1,800 and 1,200 rpm.

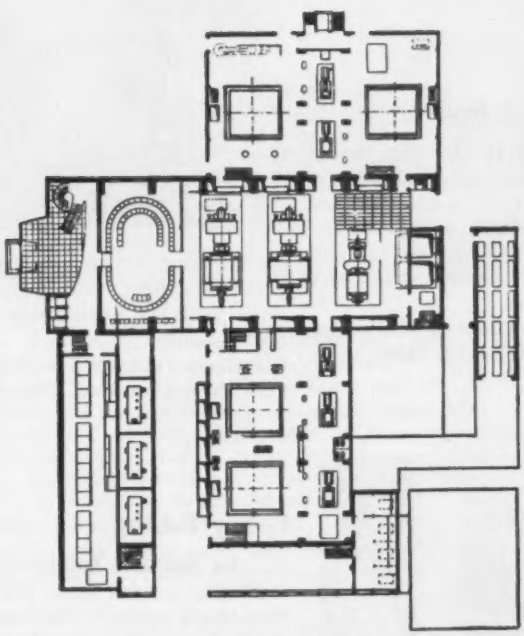
Robbins & Myers, Inc, Springfield, Ohio.

Voltage Relay . . .

. . . for over or undervoltage switches automatically to an alter-

(*Continued on page* 114)





Plan of Müllerstrasse Power Station, Munich

Today, city planners make full use of the advantages of modern district heating power stations that supply steam for heat and power generation.

Centralized heat supply for higher thermal utilization, simplified fuel and ash handling, reduced atmospheric pollution.

Planning and electrical equipment by AEG.

AEG

ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT

Berlin (West) EXPORT DEPARTMENT Frankfurt (Main)

NEW 3/4-ton Pull-A-Way
Added to WRIGHT TYPE "C" LINE!

FOUR SIZES • ¾, 1½, 3 and 6 Tons

FEATURES
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• Hooks are drop-forged
• Special alloy-steel chains
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¾-ton, 14 lbs.
1½-ton, 23½ lbs.
3-ton, 36½ lbs.
6-ton, 63 lbs.

New 3/4-ton model
• VERSATILE
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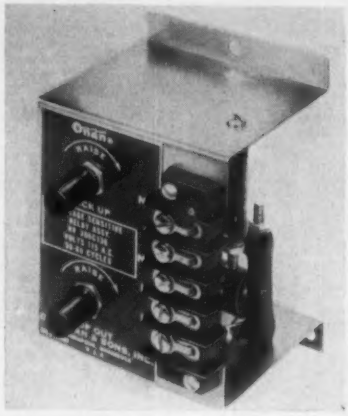
Whether a Winch Line Hook or a complete Line Body check your requirements with

UTILITY TOOL & BODY CO.
CLINTONVILLE, WISCONSIN
UT&BCo

Voltage Relay . . .

(*Continued from page* 112)



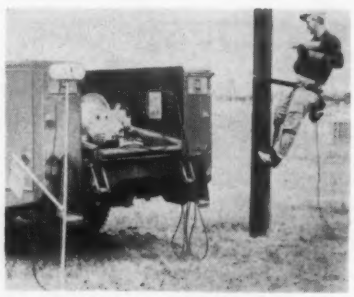
nate source of power when an improper voltage condition occurs. The Voltage Sensitive Relay picks up within 75-95% or 105-117% of normal line potential. Reswitch settings are 80-100% or 112-100%. Normal coil rating is 120 v ac.

D. W. Onan & Sons Inc, 2515 University Ave, SE, Minneapolis 14, Minn.

Combination Inverter . . .

. . . and battery charging device converts storage battery power to 110 v ac at 60 cps or charges storage batteries from a convenience outlet. Switching between inverter and charging operation takes less than ten seconds.

American Television & Radio Co, 304 E 4th St, St Paul 1, Minn.



Distribution Panel . . .

. . . is mounted on line trucks to supply service. The system is shock and waterproof and circuit-breaker protected. This Porta-watt system has eight outlets and can be furnished with interrupters for flashing lights in four circuits. The panels are primarily for use with portable generators.

Whitney Blake Co, New Haven 14, Conn.

Trencher . . .

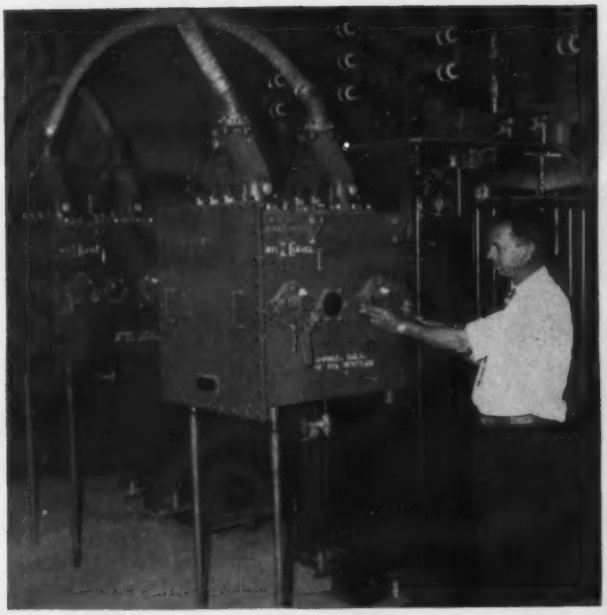
. . . features quick lateral shifting and tilting of the digging wheel. The JS-30 model digs a 24-in. trench five inches outside the 6-ft track or anywhere between. Power tilting of the digging wheel 7 deg either side of center enables it to dig vertical trenches on slopes without cribbing. Lateral shift and tilt permit trenching virtually flush with poles, walls and other above-ground obstructions.

Cleveland Trencher Co, 20100 St. Clair Ave, Cleveland, Ohio.

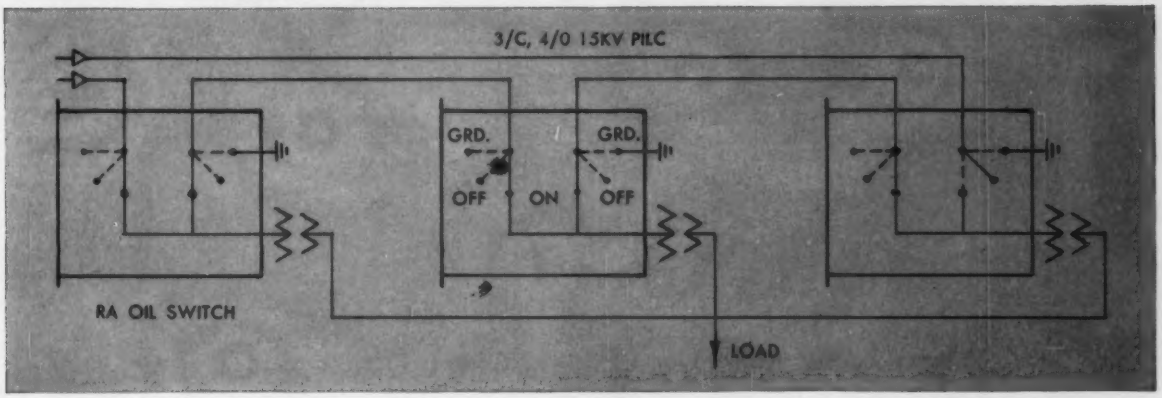
Epoxy Tubing . . .

. . . for fuse-tube holders has high resistance to moisture and good mechanical strength. The inner wall is of glass cloth and epoxy resin; the outer wall of Dacron cloth and epoxy resin. The tubing comes in lengths to 36 in., inside diameters ¾ in. and above and wall thicknesses 3/64 in. and above. It is readily machined.

Westinghouse Electric Co, Micarta Div, Hampton, S. C.



LOOP AROUND COSTLY SERVICE INTERRUPTIONS



Expensive service interruptions to a large building are minimized by looping feeder cables through G&W RA oil switches. The load is supplied by a southern utility through two feeders and three 3 phase transformers. Any two transformers or either feeder cable can carry the load for a short time. Looping the feeder cable through the oil switches (attached to transformers) permits disconnecting and grounding the feeder cables and interconnecting cables. The RA manually operated switch will safely break a full 400 ampere load at 15000 volts.

An economical RA load break oil switch is made to suit your distribution system plans. Consult a G&W representative about it.

VOLTAGE CHARACTERISTICS

voltage rating	60 cycle withstand dry	impulse withstand 1½ x 40 wave
7.5kv	36kv	95kv
15.0kv	50kv	110kv
23.0kv	70kv	150kv
34.5kv	95kv	200kv

CURRENT CHARACTERISTICS

ampere rating	switch	amperes	
		momentary	4 seconds
400	standard	20,000	15,000
	special*	30,000	19,000
1000	standard	40,000	35,000
	special*	50,000	40,000

*silver inlaid contacts

G&W ELECTRIC SPECIALTY CO.
3500 WEST 127TH ST. • BLUE ISLAND, ILL.

D581

ANNOUNCING THE NEW

up to 30 mpg!

Totally new for *total* savings! Ford's new Falcon Ranchero delivers up to 30 miles on a gallon, yet its new 90-hp Six is geared to do a real job! There are lower costs for oil, tires, brakes, parts . . . nearly everything!

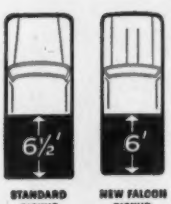
lowest priced* pickup!

The Falcon Ranchero is priced from $89 to $210 under competitive ½-ton pickups!* And that's just the start of your savings. Single-Unit construction saves on maintenance . . . it's tighter, quieter, with main underbody members zinc-coated against rust and corrosion. See your Ford dealer!

*Based on latest available manufacturers' suggested retail delivered prices with comparable standard equipment.

FORD Falcon RANCHERO

big 6-foot box!



Load capacity is more than ample for most pickup hauls—nearly 7½ feet of load length with tailgate flat. And thanks to the low loading height, loading and unloading is faster, easier!

- Up to 30 miles on a single gallon of gas
- Up to 4000 miles between oil changes
- Diamond Lustre finish needs no waxing
- Low loading height
- Instant-lock tailgate opens, closes with a single, one-hand motion
- Roomy comfort for three passengers
- Styled to capture admiration

FORD TRUCKS COST LESS

LESS TO BUY... LESS TO RUN... BUILT TO LAST LONGER, TOO!

Find Symmetrical Ratings for Cutouts

R. W. **FLUGUM**, Engineer, Distribution Apparatus Engineering, Westinghouse Electric Corp, Bloomington, Ind.

A reasonable approximation permits a symmetrical current rating to be assigned to fuse cutouts, allowing the user to compare calculated rms symmetrical fault current directly to fuse interrupting rating.

This brings calculations for fuse cutouts into line with those for circuit breakers, rated in rms amps, and reclosers, rated in rms symmetrical amps. Cutouts, however, are rated by manufacturers in rms asymmetrical amps, because their high operating speed under heavy faults makes the effects of asymmetry more pronounced.

At high currents, of the order of 80-100 times link rating, the fuse will melt before the peak of the first half cycle, in contrast with breakers and reclosers, which operate in a minimum of one to two cycles. The fuse cutout, therefore, will try to interrupt at the first current zero following fault inception. Standards specify the point on the voltage wave at which the fuse is to be tested.

The basic interrupting ability of a cutout is a function of the full offset current wave as determined by standard tests. The current wave is a function of system X/R ratio. Although X/R ratios will vary considerably with system locations, a recent study has indicated typical X/R ratios for various system capacities and voltage conditions applicable over a broad range.

A table listing typical X/R ratios for various system capacities and voltage classes has been derived by including all typical system components and impedances. Using these X/R ratios, it is possible to modify the asymmetrical rating of a given fuse cutout and assign it an rms symmetrical rating which can be compared directly to calculated fault current. If, on a given system, the X/R ratio is suspected of varying considerably from the typical values, adjustment curves can be provided to reduce application error.

The degree of asymmetry in a circuit can be expressed as a ratio of asymmetrical current to symmetrical current. The total current is the sum of the ac component and the unidirectional or dc component which appears at the instant of circuit closing or fault initiation.

The total current in a faulted circuit is expressed by the following equation:

$$i_{total} = i_{max} \cos (wt + \theta) + i_{ac} e^{-Rt/L} \quad (1)$$

This equation is based on initiation of the fault at the instant of voltage zero, which gives maximum asymmetry and, therefore, maximum peak fault current. While there is some question of whether maximum severity of interruption is a function of peak asymmetrical current or rms asymmetrical current, present practice is to use the latter value because the heating effect of any current is proportional to the rms value of current.

If equation **(1)** is integrated over a time interval, an expression of the true rms value of asymmetrical current can be obtained. This is, however, a complex equation. A conservative approximation to the rms value of the asymmetrical current is given by the following:

$$I_{rms\ asy} = \sqrt{(I_{rms\ ac})^2 + (I_{dc})^2} \quad (2)$$

$I_{rms\ ac}$ is the rms symmetrical value of the ac component, and I_{dc} is the value of the dc component obtained from the second term of equation **(1)**.

Some compromise is necessary to arrive at a single typical value for a fuse cutout which spans several voltage classes and system capacities. The change in actual rms symmetrical rating is small, however, for the tabulated variation in X/R ratio.

Minimum X/R for Fault Current Interrupting Ratings

Fault Current Amp (rms symm.)	5-kv Class Substations	8.7-kv Class Substations	15-kv Class Substations	14.4/24.9-kv Substations
to 800	5	5	8	10
1,000	5	6*	8	10
1,600	5	7*	9†	11‡
2,500	6*	8*	10†	12‡
4,000	7*	9*	11†	13‡
6,300	8*	10*	13†	15‡
10,000	10*	12	15†	16‡
20,000	12*	15*	18†	

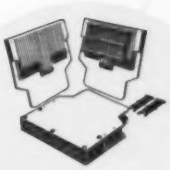
* Remains 5 for line applications ¼ mile or more from substation.
† Remains 8 for line applications ½ mile or more from substation.
‡ Remains 10 for line applications ½ mile or more from substation.

Here's the inside story of industry's

MOST RUGGED HIGH VOLTAGE SWITCH

THIS SOLENOID AIR BREAK CONTACTOR IS THE HEART OF THE A-B STARTER LINE

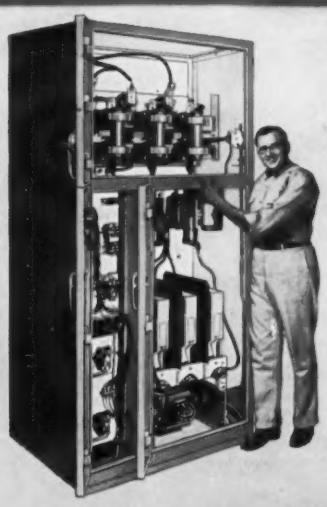
A tremendous operating life has been built into these new A-B high voltage, air break starters by using the same simple solenoid design—with only ONE moving part—that has proved good for millions of trouble free operations in Allen-Bradley low voltage starters. A-B high voltage starters are made for all types of service and for all types of motors up to 1500 hp, 2300 v; 2500 hp, 4600 v. Send for Publication 6080, today.



Faster Arc Suppression
New blowout design. Novel arc chutes are molded from an arc resistant material.

Double Break Contacts
Silver alloy contacts never need maintenance. Vertical motion assures uniform contact pressures.

Only One Moving Part
Simple solenoid design eliminates trouble-causing pins, pivots, and flexible jumpers.



A-B High Voltage Starter with Air Break Contactor

Bulletin 1159 high voltage air break, across-the-line induction motor starter in NEMA Type 1 enclosure. All Allen-Bradley high voltage starters are equipped with current limiting fuses with interrupting capacities of 150,000 kva at 2300 v; 250,000 kva at 4600 v.

ALLEN-BRADLEY

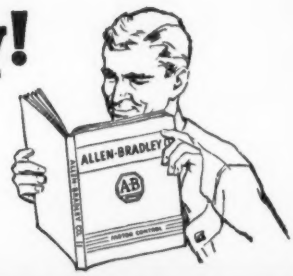
Member of NEMA

Quality Motor Control

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Some more special controls that are "standard" with Allen-Bradley!

Even Khrushchev couldn't claim a more complete line!



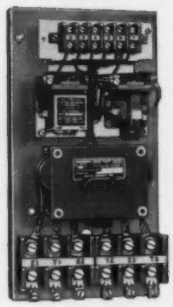
A-B QUALITY

Phase Failure Phase Reversal Relays

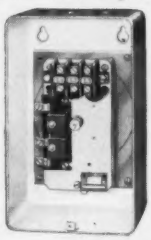
The Bulletin 812 Style RF relay responds to *all* open phase conditions on a branch motor circuit and immediately removes the motor from the line. Also, the motor is disconnected when a phase reversal occurs anywhere in the system on the line side of the relay. "Fail safe" design.

Phase Failure, Style F covers f.l. currents from 1.5 to 300 amp in 4 sizes. Coils to 600 v, 60 cycles.

Phase Reversal, Style R made with coils for 110, 208/220, 440, 550 v for either 50 or 60 cycles.



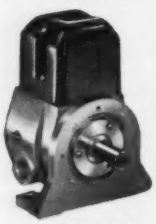
Bulletin 812 Style F



Bulletin 812 Style R

Zero Speed Switch

Used for "plugging" duty, these switches prevent coasting and bring squirrel cage motors to a sudden stop. Also used to prevent application of reverse power before motor comes to a full stop. Adjustable operating speed.



Bulletin 808

Low Pressure Switch

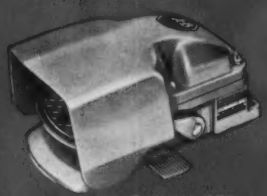
Especially designed for domestic water pump service and commercial air compressor service. These inexpensive compact switches offer pressure ranges from 15 to 200 psi.

Bulletin 830

Bulletin 803

Rotating Cam Limit Switches

Heavy-duty pilot controls used on rotating machines to initiate functions at any point of rotation. Made with up to 12 individually adjustable, independent circuits.



Bulletin 805

Foot Switches

Built for toughest service. Has maintenance free, snap-action contacts. Extended base prevents tipping. Made with hood (left), with top guard and without guard.

Bulletin 836 Style T

Pressure Controls

Oiltight enclosure for machine tool hydraulic systems operating at pressures up to 5000 psi. Operating pressure and differential are adjustable. Indicator shows trip point. Silver contacts never need service attention.

Bulletin 837 Style A

Temperature Controls

Newly designed bellows provides lower differentials. Rugged construction permits continuous cycling from zero to maximum setting. Vibration or mounting angle will not affect accuracy of operation. Temperature ranges from −150°F to 490°F.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

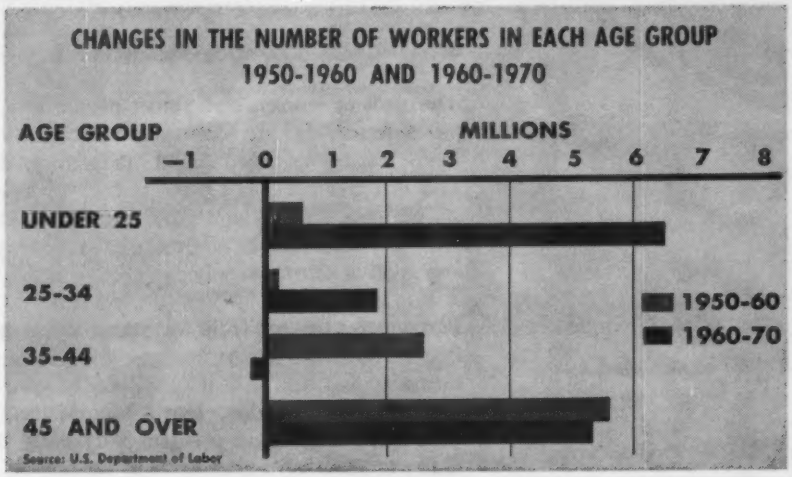
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

7-60-RM



What's Ahead in Employment?

Report on
Electrical Business Outlook

Vast changes will sweep the U.S. labor force in the next 10 years. There will be almost 14 million new jobs, opening up unequalled opportunities for some workers; but there will be keen competition for the better jobs and a rising emphasis on more and better education. And for businessmen, new problems in hiring and training will develop. The biggest spurt of new openings—predominantly professional and technical jobs—will call for more highly skilled people than ever before. But the available manpower will be concentrated in the youngest age groups (below 25), and a rising proportion will be women. Most important, there will be a critical shortage of junior executives. These are highlights of *Manpower: Challenge of the 1960's,* a report just issued by the U.S. Department of Labor. Here are the highpoints:

• **The days are numbered for the unskilled and semi-skilled worker.** Although the overall demand for workers will increase about 20%, the demand for unskilled workers will not grow at all by 1970.

• **Business will employ 41% more technical and professional people by 1970,** as well as 27% more clerical and sales workers. But there will probably be 17% fewer farm hands—and they will feed 208 million people.

• **Of the 13.5 million new jobs that will open up within 10 years,** roughly half will go to youngsters, aged 14-24. In all, 26 million new young people will swarm into the labor force to step into these jobs and supply replacements for the normal attrition due to retirements and deaths. This horde of youngsters, products of the post-war baby boom, will enter the labor force at a 3 million a year clip by the closing 1960's, a 50% increase over today.

• **In contrast to the burgeoning younger group,** the key working age group (age 25-44) will increase by only 1.6 million. In fact, the 35-44 age group, from which business selects its young executive talent, will actually decline in numbers as the sparse crop of depression babies moves toward middle age. In all, there will be 400,000 fewer men, aged 35-44, by 1970, but an increase of 200,000 female workers in this age group will help ease the shortage. Result: Vast opportunities will open up for top workers who are now 25 to 34.

• **One out of three workers by 1970 will be women,** freed from home chores by labor-saving appliances and quick-foods. By that time, the Labor Dept. expects nearly one half of all women 35-64 to be working, and female employment will rise to 30 million, compared to about 23.5 million today.

What These Changes Mean for Business

The rush of women and young people into the labor force will create new problems of training, but there will be fewer experienced supervisors and junior executives, aged 35-44, to perform this and other management jobs. This will create a major problem for personnel managers in the next 10 years. As business expands and gross national product rises 50%, junior executives for sales, management and technical functions will be in greater demand than ever, and in shorter supply.

Fortunately, the scramble for young talent is not yet intense, McGraw-Hill's Economics Department observes. But firms that ignore the problem, fail to recognize and deal with it early, will have to prepare for an intensive struggle that will surely develop. It will become increasingly important to train young people for responsible positions very early in their business careers. In addition to scouting, attracting, and holding all the top young talent a company can muster, special efforts will be required to insure loyalty so that a young worker's knowledge and experience will pay off when he matures. On-the-job training programs, financial assistance for college and graduate schooling, exposure to all fronts of a company's business, generous fringe benefits—all may tend toward necessities rather than fringe inducements in the years ahead.

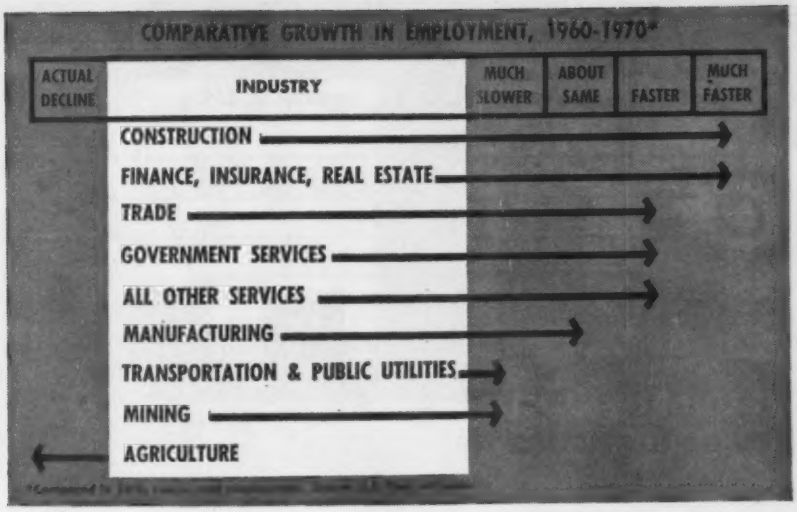
Already there is increased emphasis on management development programs. Most big companies will probably provide advanced educational programs in the future to prepare their middle management for top management positions. The smaller companies, as well as many of the larger ones, will send more of their middle management people to training courses organized by the American Management Association, as well as to the special sessions at the nation's top business schools, such as the Sloan program at MIT, and Harvard Business School's Program for Management Development.

What Does This Mean for the Utilities?

Automation is expected to make employment problems much less severe for the utilities than for other lines of business. Although the utility business will double in the next 10 years, the number of employees is expected to go up much slower than the Labor Department's overall estimate of 20%. This was affirmed in an Electrical World spot survey of 12 electric companies across the nation.

While six of the utilities polled were not feeling severe labor shortages now, all but two of the 12 expect shortages ahead. Greatest tightness is expected in the specialized areas, such as engineering, with the biggest shortages in electrical engineers and in skilled mechanical and operating people. Other critical areas mentioned: (1) Qualified people to handle computer installations, (2) Nuclear engineers, (3) Sales engineers, (4) Supervisors, (5) Sales promotion people, (6) Home economists, (7) Secretaries, (8) Keypunch operators, (9) Stenographers, (10) Typists, and (11) Construction workers.

Most companies plan to hold the line on employment, relying on automated equipment to absorb much of the increased workload of increased business. Of the utilities polled, employment rose 17% in the past 10 years, although there was wide dispersion, with a median increase of only 12%. By contrast, the



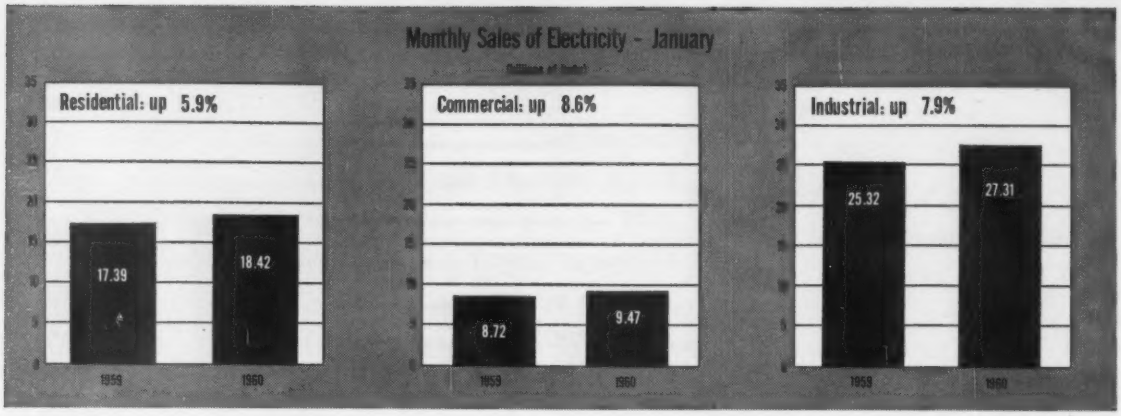
next 10 years will bring forth no such increase; the companies estimate an average 8% gain in employment by 1970, and two expect no increase at all.

Most are already hiring a large proportion of younger people, aged 18-24, and foresee no new problems in training the tide of young workers the Labor Department expects in the future. Except for one large utility, which now has about 15% women employees and wants to hire many more to relieve male employees of the most routine jobs, the utilities in World's sample expect no large increase in the number of women workers. One company, in partial agreement with the Labor Department's forecast of more women in the workforce, says it will hire a few more to do highly skilled technical jobs, such as computer programming—but very few.

"Within 15 years most of our company's management will retire; in fact half our employees are over 45 years old. In 10 years the youngsters from our cadet training program will be 30-35 years old, and they'll have opportunities for promotion never before equalled in this company." That comment from a personnel director sums up the most common concern of all in the EW survey. This problem, the development of future top executives, is intensified by the age distribution in the industry, as well as the shortage of younger people expected in the years ahead. In the typical company, 40% of the employees are over 45, the survey showed.

All 12 of the companies had some sort of management development program, but three lacked any planned management training program. Although most companies agreed that a replacement table, showing two or more candidates to step into future key jobs, was absolutely essential to the business, three companies had made no provision of this sort.

The management programs were diverse. Some were of the "cadet" variety, while others were only for men who had attained first level management positions. One company had management development programs for supervisors, middle management, and top management, as well as a general six-month rotation policy as a broadening experience for most employees. Another had a lateral development program, in which key men moved from job to job until they were promoted. And some had external programs; one had a year-long nuclear engineering course, as well as a business administration course, set up with local universities, supplemented with internal programs as well. All agreed, though, that the bulk of future promotions would be from within.



Power Statistics

		Latest Month	Year Ago	Annual Change %
Capacity	Jan.	157.01	143.80	9.2
Est. Dec. '59 Peak (million kw)	Dec.	121.6	125.7	−0.8
Est. Dec. '60 Peak (million kw)	Jan.	133.7	134.8	−0.8
Production—billion kwhr	Jan.	64.02	59.94	6.8
Hydro		13.01	11.29	15.2
Fuel		51.01	48.65	4.9
Sales—billion kwhr	Jan.	58.23	54.28	7.3
Residential		18.42	17.39	5.9
Commercial		9.47	8.72	8.6
Industrial		27.31	25.32	7.9
Other		3.03	2.85	6.3
Fuel Consumption	Jan.			
Coal—million tons		16.08	16.14	−0.4
Oil—million barrels		10.62	9.97	6.5
Gas—billion cu ft		98.66	86.83	13.6
Net Income Class A & B Co's—$ million	Jan.	168.70	157.86	6.9
Residential Customers—millions	12 mos.	49.10	47.88	2.5
Revenue per kwhr	ended	2.50¢	2.53¢	−1.2
Avg kwhr per customer	Jan. 31	3,598	3,391	6.1
Avg annual bill		$89.95	$85.79	4.8

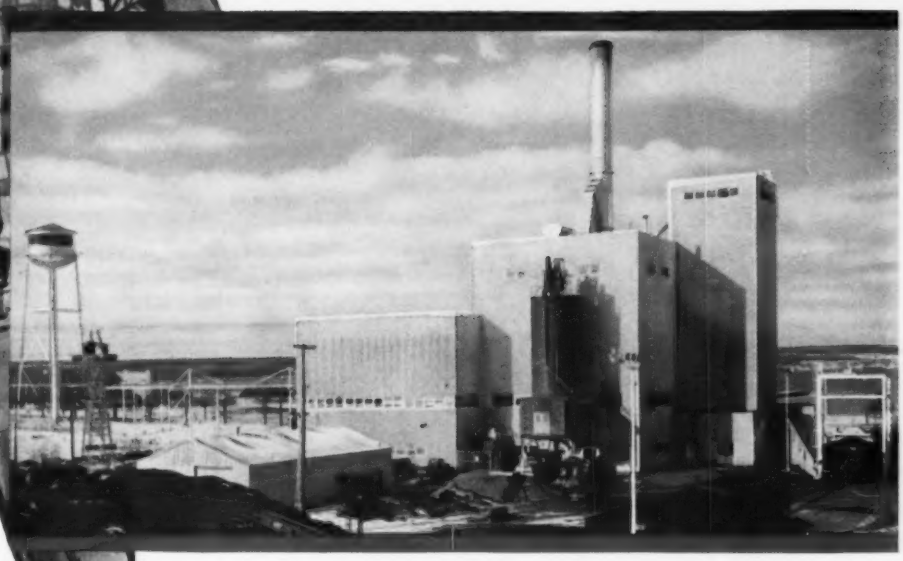
Business Statistics

Indexes: 1947–49 = 100				
FRB Industrial Production	Feb.	170	157	8.3
ENR Construction Cost	Apr.	170.6	164.4	3.8
BLS Cost-of-living	Feb.	125.6	123.9	1.4
New Orders for Machinery (1950 = 100)	Feb.	173	185	−6.5
NEMA Sales				
Insulation materials	Jan.	146	130	12.3
Electric appliances		79	88	−10.2
Wholesale prices				
Motors and generators	Jan.	145.4	146.4	−0.7
Transformers and regulators		146.8	148.8	−1.3
Switchgear and fuses		178.1	172.0	3.5
GNP—annual rate—$ billion	4th qtr.	483.5	457.1	5.8

Significant changes: The FRB Index of Industrial Production, one of the most sensitive and reliable business indicators, has been rising strongly since the middle of last year, but many economists are waiting for March and April figures before they pass judgment on 1960's business vigor.

Stone & Webster Demonstrates

IMAGINATION IN MICHIGAN



In L'Anse, Michigan, Stone & Webster Engineering Corporation recently designed and constructed the John H. Warden Station for the Upper Peninsula Power Company. Completed within 16 months after ground was broken, the new station not only supplies needed power for a fast growing area, but also fulfills electric power and process steam requirements of the adjacent Celotex Corporation board mill.

Here creative engineering . . . combined with client cooperation . . . provides Celotex with reliable power and steam and eliminates their need for a staff of experienced utility operators. By combining power generation with process uses, substantial fuel savings are realized.

On most engineering projects . . . whatever their scope or purpose . . . the skills and experience of Stone & Webster engineers can effect construction economies and add to a plant's long-term operating efficiency. For complete information on how we might best serve you, call or write our nearest office.

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New York Boston Chicago Pittsburgh Houston
San Francisco Los Angeles Seattle Toronto

NEW 333-KVA FEATHERWEIGHT POLE STAR® TRANSFORMER SUITABLE FOR MOUNTING ON CLASS 3 OR CLASS 4 POLES

Pennsylvania triples power per pole in just seven years!

Development of the 333-kva Featherweight Pole Star means that the practical limit for single-transformer power per pole has been more than *tripled* in just seven years. Pennsylvania first broke the "100-kva barrier" on pole-mounting by introducing the 167-kva Featherweight in 1953.

Total weight of the 333-kva Featherweight Pole Star—available through 15 kv—is approximately 2200 pounds. Thus, on the basis of National Electric Safety Code requirements, the 333-kva Featherweight is suitable for mounting on either a 45-foot Class 3 or 35-foot Class 4 southern pine or douglas fir pole.

It is of more than historical interest that the new Featherweight weighs only half as much as the 333-kva, 15-kv Pole Star of just four years ago. Besides permitting more power per pole, this remarkable weight reduction means easier handling, easier installation on pad or platform and less costly supporting structures.

Lower Impedance, Improved Regulation

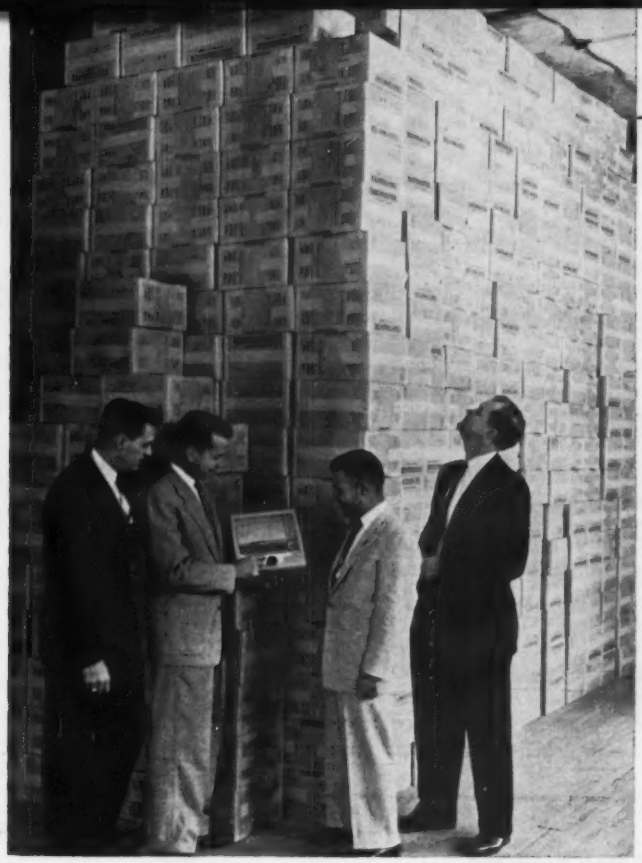
In addition, the new 333-kva Featherweight Pole Star provides improved regulation—with average impedances of 2.5 to 3%, compared to an average of 4 to 5% for the station-type unit it replaces. Other operating characteristics are equal to or better than those of station-type transformers.

The family of Featherweight Pole Stars now includes 167, 250 and 333-kva units, 15 kv and below—especially suitable for new shopping centers, for established neighborhoods with fast-growing load requirements, and for other applications requiring the maximum in pole power. Contact Distribution Sales, Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW-EDISON

PENNSYLVANIA DISTRIBUTION TRANSFORMERS

Southwestern PS Sells 3,850 Portable Electric Heaters



SALESMEN AT Southwestern PS look over stock of portable electric heaters used in sales campaign, before shipping them to customers

An employee sales campaign, depending completely on employee efforts, with no company advertising backing the promotion, sold 3,850 portable electric heaters in a two-month period.

The incentive in the Southwestern Public Service Co campaign was that each sale brought the salesman a complete book of Frontier Savings Stamps, a very popular regional premium.

Sixty-nine employees sold ten or more heaters. Of the company's 1,797 employees, 926 participated in the promotion. George Duey, a serviceman in Lubbock, Texas, was the top individual salesman with 121 units. The distaff side scored heavily in the Plainview Division. Agnes Braly, sales promotion assistant, sold 72 units; cashier Sally Damron brought in 53 sales. In the small Panhandle community of Channing, 30% of the utility customers purchased heaters, with manager L. F. Denney selling 55.

Quota for the two-month promotion was 1,628 units. The Panhandle Division, Southwestern Public Service's largest, sold that many itself. The Southern Division in Lubbock reported the largest percentage of quota.

Marvin Standefer, manager of electric heating and builder sales, estimates the EAR for the promotion at $38,000.

The heaters were sold at retail price of $19.95, on a cash, six-months, no carrying charges, or add-it-to-the-bill basis. The six-month payment plan was used by 70% of the purchasers.

Toastmaster officials, makers of the units used in the promotion, were so pleased with the results that they saluted Southwestern PS at its annual sales meeting. Arlie Hudson, Southern Division manager, was presented with a gold-plated heater in honor of his division selling the largest percentage of quota. Prizes were given to first and second-place winners in each division.

The promotion was created by W. L. Pearson, vice president-sales; J. B. Austin, residential and commercial sales manager; and Standefer.

PS of Oklahoma Records 4,236 Freezer Sales

Freezer sales in a Public Service Co of Oklahoma campaign were so spectacular that they more than doubled what was set as the estimated sales quota. Since the program involved a free frozen-food bonus with each freezer sold, the unanticipated success of the campaign strained the company's sales budget to almost embarassing proportions.

A total of 4,236 units were sold. They were broken down thusly:

Freezers (min 5 cu ft)	2,159
Combination refrigerator-freezers, exterior double-door	1,750

DISPLAY SHOWS advertising pushing frozen food bonus offer part of P S of Oklahoma campaign

Combinations—single-door min 2.3 cu ft freezer capacity 327

A 280% increase over the same period of the year before resulted, and sales reached 1.95% of the total residential meters.

Key to the campaign was $30 worth of free frozen foods offered by the company for each freezer sold. In some cases, dealers matched this offer to spur their own sales.

Three weeks before the start of the campaign, letters were sent to all distributors explaining the program and asking them to "take it up" with their dealers. Two weeks before the start, letters were sent to all dealers explaining the promotion and asking them to tie in.

Letters also went to grocers urging them to cooperate with appliance dealers. PS of Oklahoma representatives then contacted freezer dealers and explained plans, signed agreements with dealers, distributed display material, and suggested display layouts and cooperative advertising plans.

A Freezer Fun Contest gave dealers a chance for drawings held at the end of the campaign. Dice were rolled with dealers to determine number of chances they would get in the drawings, and, as they were held on a periodic basis, it gave sales representatives an opportunity to return to each dealer store several times.

The contest was based on the number of sales made by dealer salesmen, and contributed greatly towards maintaining dealer enthusiasm. It was, therefore, credited with much of the campaign's success.

Offers of the Frozen Food Premium were made by dealers and redeemed by freezer purchasers at the grocer of the dealer's choice.

The utility paid 33⅓% of the cooperative advertising used by dealers.

SELLING BRIEFS

Tampa Electric Co certified an additional 77 homes as **Medallion Homes** in February. Gold Medallions will be given to 47; the rest will get Bronze Medallions. Company attributes an increase in GMH sales to a wider public acceptance of year 'round electric heating and air conditioning.

Factory sales of automatic and wringer washers, and combination washer-dryers were up in February. Automatic washer sales were up 10%; wringers, 19%, and combinations, 17%. Gas clothes dryers were up 3%, but electric dryers were down 6%. Total sales of all units in February amounted to 408,388 units, a 7% increase from January, the American Home Laundry Manufacturers' Assn reported.

$250,000 cooperative **sales promotion campaign** concentrating on automatic dishwashers, refrigerator-freezers, and automatic clothes dryers, is being planned by Consolidated Edison Co of New York. Dishwashers will be promoted this month, refrigerator-freezers in June and July, and dryers in the fall. Con Ed's TV and radio personality, Susan Strong, will make special in-person appearances at stores of dealers whose names were drawn at a special sales meeting March 23.

Electric home heating booklet for use by electric utilities and contractors in connection with promotional activities on electric heating is offered by Channing L. Bete Co, Inc, Greenfield, Mass. Single copies: 25¢ ea; discount on quantity orders.

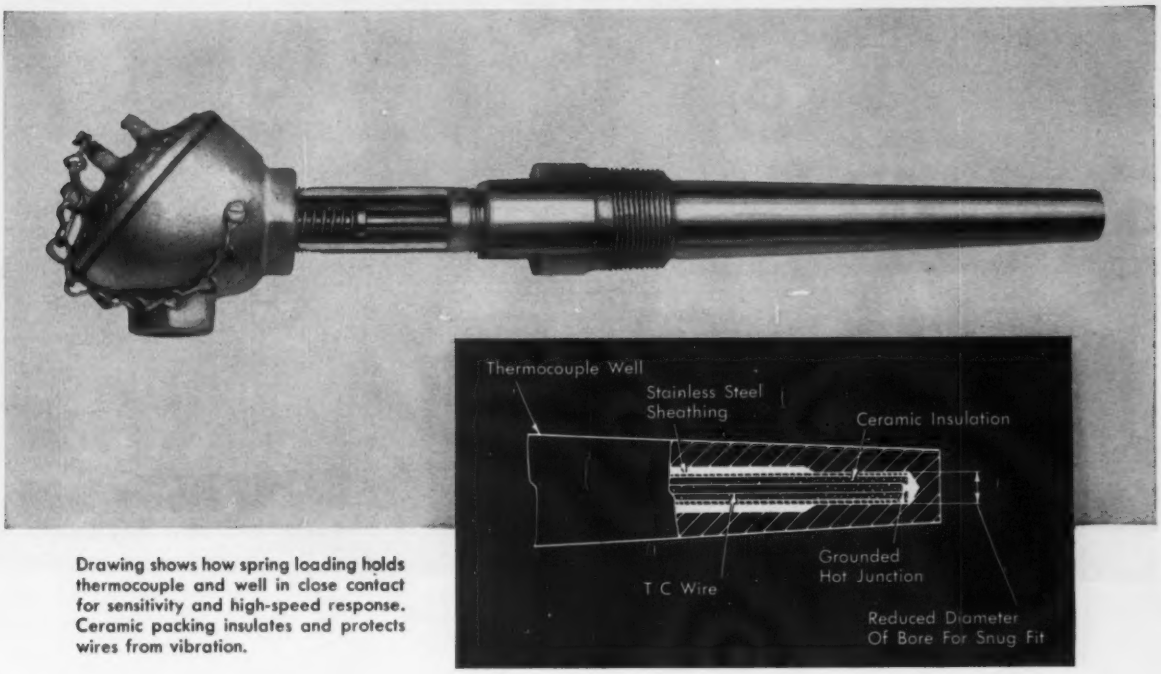
Three Westinghouse Electric Corp Lamp Division engineers have received a $9,000 **patent award.** Research Engineer George Meister, Development Engineer Albert Wainio, and Equipment Design Engineer Stanley Lopenski were each awarded $3,000 for their invention of an electrostatic bulb coating machine.

Combination **post lantern** which not only lights driveways, walkways, gardens, patios, etc, but also destroy night-flying insects attracted to its light, has been developed. Detjen Corp, Pleasant Valley, N. Y., reported the lantern has an electric eye, five-year light bulb and an all-weather convenience outlet.

Recent Live Better Electrically **publicity** has appeared in *Good Housekeeping* magazine, March; *Vogue* Magazine, February; *Forecast for Home Economists,* February; *Better Homes & Gardens,* February; and *Glamour,* March.

To give future homemakers—and future customers—the opportunity to learn first hand the benefits of electric cooking, Houston Lighting & Power Co is furnishing **free new electric ranges** to home economics departments of schools in the service area. Since the program was inaugurated this year, three dozen 1960 model ranges have been installed; more than 200 more will be furnished by the end of 1961.

A 198-kw **lighting system** of General Electric Co "Quartzline" lamps has been installed at Raynham Dog Track in Massachusetts. Lighting levels are considerably greater at the finish line and in front of the grandstand than in an average office.



Drawing shows how spring loading holds thermocouple and well in close contact for sensitivity and high-speed response. Ceramic packing insulates and protects wires from vibration.

measure temperatures of high-pressure, high-velocity steam with

New spring-loaded thermocouple

- **High sensitivity**
- **Fast response**
- **Rugged well design**
- **Field-proved**

Design of this rugged, fast-acting thermocouple has been improved to combine high sensitivity with superior mechanical strength.

The thermocouple element is protected from vibration by an inert magnesium oxide packing which holds wire in place inside a stainless steel tube. Two features assure high-speed response to temperature changes: (1) the bore in the well is large enough to permit easy removal of the thermocouple element, and has a smaller diameter near the hot junction to provide a tight fit for highest sensitivity; and (2) spring loading provides positive, metal-to-metal contact between thermocouple and well, for highest rate of heat transfer to the measuring section.

Available in three styles: single-tapered and threaded, and single-tapered for welding in a drilled hole, or double-tapered for welding in a drilled and reamed tapered hole. For working pressures to 5000 psig, temperatures to 1250° F., velocities to 225 fps.

Your nearby Honeywell field engineer can give you complete details. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

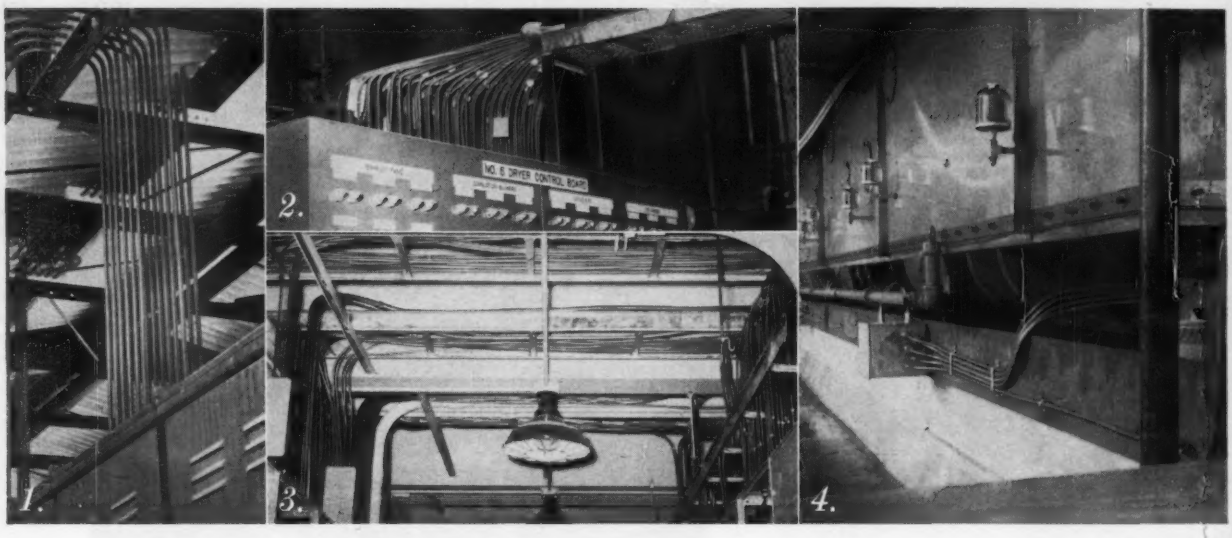
● **REFERENCE DATA: Write for Specification S001-1a**

75th YEAR — PIONEERING THE FUTURE

Honeywell

First in Control

SINCE 1885



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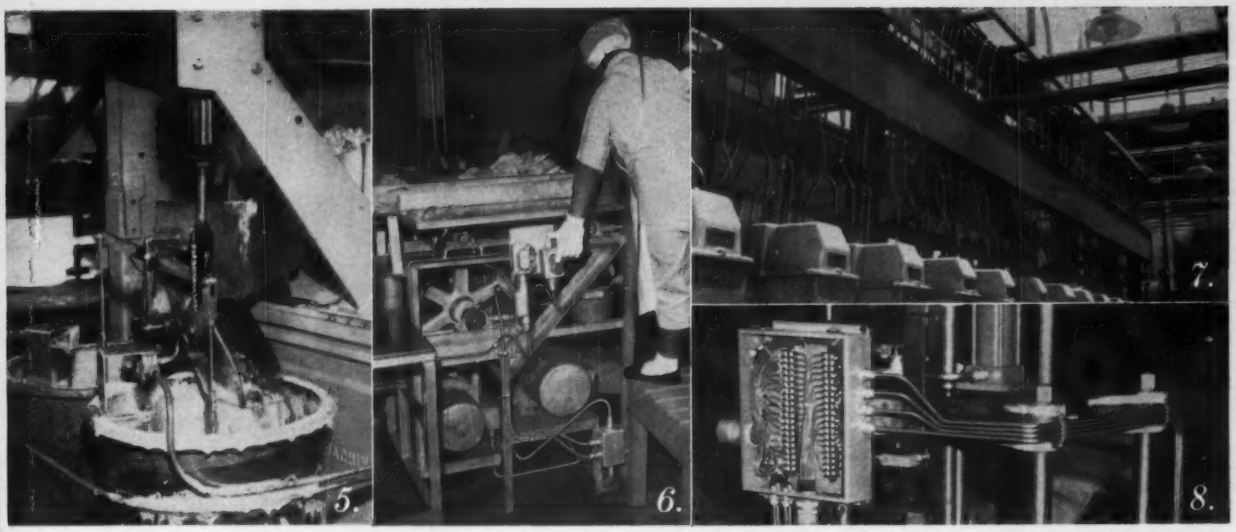
Economical m.i. easily installed passage throughout the cable control and instrumentation. able in our Type MI (Mineral be sent to you upon request m.i.

MI installed in 1. Oil refinery 2. Chemical plant 3. Dairy 4. Printing press 5. Pineapple cannery 6. Tuna packing plant 7. Oil refinery 8. Automotive plant



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m.i. compact m.i. fireproof m.i. no vapor run m.i. ideally suited for power Detailed information is avail- Insulated) catalog. A copy will

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Baltimore G&E Names Trice, Marburger VPs

TRICE

Baltimore Gas & Electric Co has named Thomas W. Trice, vice president-electric operations, and Thomas E. Marburger, vice president-engineering and construction. Joseph R. Weger has been named assistant secretary and assistant treasurer.

Trice joined Baltimore G&E in 1935. He was assistant general superintendent, electric operations, from 1942 to 1950, and then general superintendent, electric operations.

Marburger started with the company in 1922. He served as assistant general superintendent, electric operations, from 1951 to 1957, and then general superintendent, electric engineering and construction.

MARBURGER

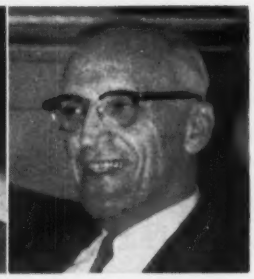
Simplex Wire & Cable Elects Three New Vice Presidents

John W. Logan has been elected executive vice president, Dr John T. Blake, senior vice president, and G. J. Crowdes, vice president, of Simplex Wire & Cable Co.

Logan, who will direct all operations of the company, joined it in 1959 as vice president. He was employed by General Electric Co in 1931 and served in various managerial capacities until 1953. In that year he became president of Cambridge Corp, where he remained until he joined Simplex.

LOGAN

BLAKE



CROWDES

Dr Blake will be responsible for all engineering and manufacturing activities of the company. He joined Simplex in 1924, became director of research in 1940, and vice president in 1956.

Crowdes will have charge of all engineering activities at Simplex. With the firm since 1918, he became chief engineer in 1950. He was appointed director of engineering in 1958.

Palmer Made Executive Vice President of C. H. Wheeler

Donald Palmer has been elected executive vice president of C. H. Wheeler Manufacturing Co, and vice president of Hamilton-Thomas which owns C. H. Wheeler.

Palmer has been with Wheeler for seven years, serving as production manager, assistant to the president, and vice president, administrative. Prior to that he was chief industrial engineer at U. S. Pipe & Foundry Co, and production superintendent at the DeLaval Steam Turbine Co.

He is also a member of the board of the Griscom-Russell Co which is owned by Hamilton-Thomas.

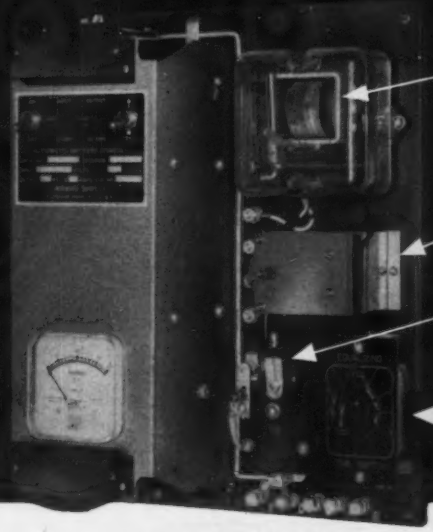
(*More News About People on page* 134)

ONE OF A SERIES: ASCO Complete Emergency Control Systems Put Standby Power in Action—FAST

Industrial Type Construction Throughout

Unit Chassis Type Charger

- Choice of 2 or 3 input voltages provided by tapped transformer
- Charging current indicated by 0-20 amp. ammeter
- Charger components protected by input and output fuses
- On-Off input toggle switch
- Momentary test toggle switch



Temperature compensated Battery Voltage Sensing Relay with dust proof cover

Field-proven, long-life A-C Motor Driven Timer

Industrial type Battery Charging Contactor with silver-gold low-resistance contacts

Selective Time Equalizer Switch provides equalization of cell charge

NEW ASCO® BATTERY CHARGER KEEPS STANDBY POWER PLANT BATTERIES FULLY CHARGED...AUTOMATICALLY

New ASCO Battery Chargers automatically keep engine starting batteries fully charged; no more weak batteries to prevent starting in an emergency. Maintenance time is minimized; the operator merely maintains the proper water level.

In Operation: while engine is stopped the battery is checked automatically once each hour. Full rate charge is applied (if required) until battery is in fully charged condition; at that time, the charger disconnects automatically. Plus Features – charger is automatically disconnected during cranking period; starts recharge immediately after!

New automatic battery charger also protects against overcharging, assures longer battery life. Electrical Characteristics: Input to 600 V. A-C, output: 6-12-24-32 V. D-C; charging rate, 6.0 amperes.

For complete information write for Bulletin 237.

Now you can select an ASCO Battery Charger to meet any of your requirements. Other battery chargers in the comprehensive ASCO line:

Non-automatic ASCO Battery Chargers: available with input voltages to 600 V. A-C; output: 6-12-24-32-36 V. D-C. Specifically designed for heavy-duty industrial use, they feature selenium rectifiers and continuous adjustment charging rate from 0.05 to 2.0 amps.

For complete information write for Bulletin 203.

ASCO Trickle Rate Chargers feature continuous adjustment range of 50 to 200 milliamperes; input 120 volts A-C; output 6, 12, 24, and 32 volts D-C.

For complete information write for Bulletin 236.

All ASCO Battery Chargers are designed to industrial control standards.

Dependable control by ASCO...

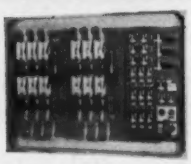
ASCO Electromagnetic Control

Automatic Switch Co. 50-P HANOVER RD., FLORHAM PARK, N. J., FRONTIER 7-4600

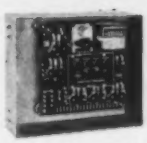
AUTOMATIC TRANSFER SWITCHES • SOLENOID VALVES • ELECTROMAGNETIC CONTROL

ASCO

ASCO CONTROL SYSTEM COMPONENTS:



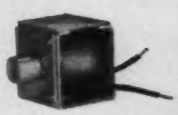
Automatic Transfer Switches, *for all classes of load to 750 volts AC-DC, transfer connected load to standby power when failure or substantial reduction of normal power occurs. Return load automatically when full power is restored—in sizes from 10 to 2000 amps. Write for Catalog 57-S1.*



Automatic Engine Starting Controls *provide fully automatic starting and stopping of diesel or gas engine driven generating sets. Write for Catalog 57-S6.*

Load Demand Controls *automatically initiate starting of engine when load is applied; stop it when load is removed. Write for Catalog 57-S6.*

Solenoid Valves *for air starting applications; for controlling the flow of cooling water; fuel oil and other liquids and gases. Write for Catalog 202.*



Solenoids *for fuel control devices, operating shutters for engine cooling, and other electric plant applications. Write for Catalog 57-S5.*

Bishop Names McCormack Vice President-Sales

Frank X. McCormack has been named vice president of sales for the Bishop Manufacturing Corp and Bishop Export Co.

He came to Bishop in 1952 as sales engineer and then became assistant sales manager in 1955. In 1958 he was named sales manager in charge of the Electrical Insulating Tape Division.

Pinkston Elected VP at United Engineers

John T. Pinkston has been elected a vice president of United Engineers and Constructors, Inc.

He will retain his responsibility as process consultant and will be in

charge of all process development activity for the firm.

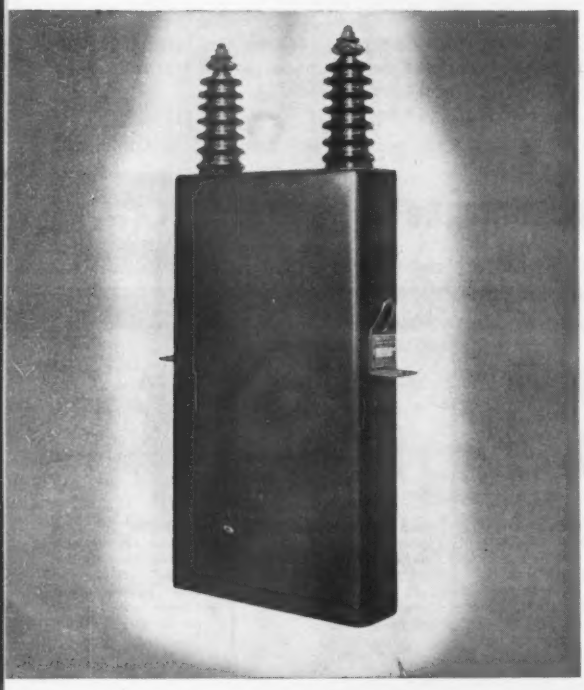
Pinkston joined United Engineers in 1959. Before that, other positions included manager of Catalyic Construction Co.

Trees Made VP-Marketing At Kellogg Switchboard

Kellogg Switchboard & Supply Co has named Charles J. Trees vice president-marketing. The appointment is part of a consolidation of manufacturing and sales operations.

Trees was formerly vice president-American operations for Centrax Ltd of London. Before that he was with the Flight Propulsion Division of General Electric Co.

G-E "COMPACT ISOKRAFT* 50" CAPACITORS OFFER



900 KVARS AT

General Electric's new "COMPACT ISOKRAFT 50" capacitor represents the lightest and most compact 50-kvar unit available. And because of these benefits, higher rated, lighter capacitor equipments can be installed in locations where weight and size are limiting factors.

Single-row capacitor equipments offer the cumulative weight reduction of these new, 4-inch-thick, 82-pound, 50-kvar units. They weigh less and, installed, have less extension beyond the pole. Easier, less expensive installation and improved appearance on the pole result.

"COMPACT ISOKRAFT 50" capacitors help make available a 900-kvar single-row equipment that weighs less than the first 600-kvar equipment introduced in 1956. And the 900 kvars fit into an

*Trademark of General Electric Co.

Robert H. Sims has been appointed to the newly created position of superintendent of operations for Jersey Central Power & Light and New Jersey Power & Light companies. **Joseph I. McGee** has been made safety director; **Norman Reid,** senior safety representative; **Augustus W. Stephens,** senior safety representative; **George R. Wist,** maintenance supervisor at Sayreville Station; and **Clarence DeGraw,** maintenance supervisor at Werner Station.

Marshall G. Hardesty has been elected treasurer of the Iowa Electric Light & Power Co.

Roy W. Amidon has been promoted to superintendent of the electric meter department of the Electric Power Board of Chattanooga. He succeeds **Elwood E. Doudna** who retired after 50 years of service.

Shawinigan Water & Power Co has made **Alan D. Campbell** supervising engineer in charge of the system analytical section, Engineering Division; and **Claude M. Langlois,** communications engineer, communications section.

Georgia Power Co has named **R. C. Ashe,** Athens Division meter superintendent, and **J. H. Dodson Jr,** meter laboratory supervisor.

New York State Electric & Gas Corp has made **Richard S. Murray,** administrative assistant to the Western Division manager, and **Tunis E. Barhite** succeeds him as local representative at Silver Creek.

R. F. Pack has retired as board chairman of the Northern States Power Co.

Quebec-Hydro-Electric Commission has made the following appointment: **Rene Gauthier** and **Serge Godbout** as manager and resident engineer, respectively, of the Carillon Power Development; **Fernand Talbot** as resident engineer, road construction, Manicouagan Power Project; **Robert Brunette** as electrical engineer of the Northwestern System; and **Claude Blais** as supervisor of industrial sales.

Florida Power Corp has named **T. I. Wetherington,** air conditioning specialist; **N. Hadley Heindel** to full responsibility of the real estate and tax department, and **Marian Radcliffe,** home service director. **Robert C. Pourtless,** vice president in charge of real estate, taxes and rates, has retired.

Bernard O'Brien has been appointed assistant controller at Iowa-Illinois Gas & Electric Co.

Elwin E. Linden has been named executive assistant at Narragansett Electric Co.

Charles P. Crane, chairman of the board of Baltimore Gas & Electric

(*Continued on page* 136)

600-KVAR WEIGHT

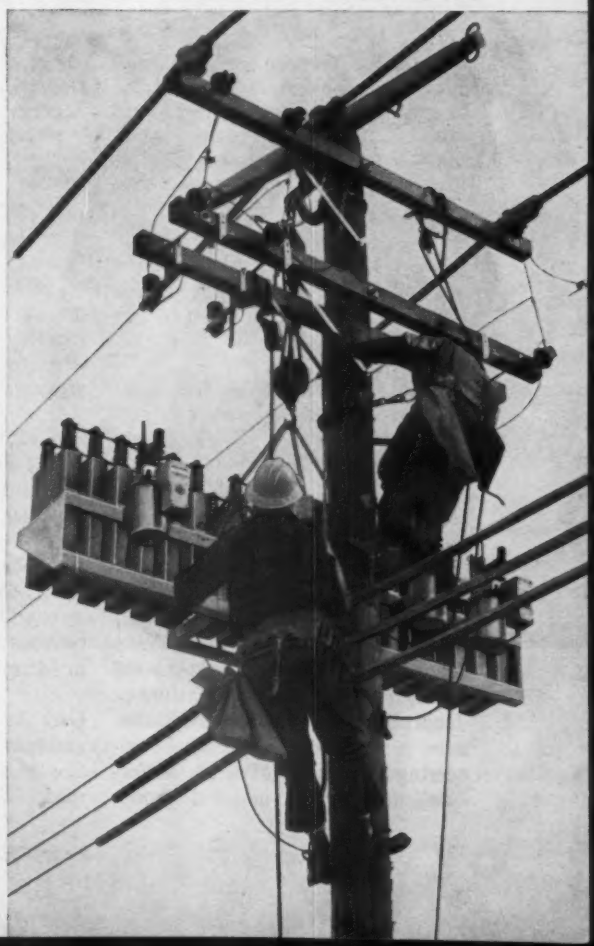
equipment that extends only 5 inches more beyond the pole than a 600-kvar equipment with superseded 50-kvar units.

And further reducing costs, self-protecting aluminum racks and corrosion-resistant stainless-steel capacitor cases eliminate the need for periodic protective paint maintenance.

For more complete information contact your General Electric Apparatus Sales Representative, or write for Bulletin GEA-7061, General Electric Co., Section 445-32, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Co, has been named chairman of the Airport Board.

James R. Smith becomes electrical planning engineer for Western Massachusetts Electric Co.

John P. Zollo, operating superintendent of the Rumford Falls Power Co, has been chosen one of the three Outstanding Young Men of the Year by the Maine Junior Chamber of Commerce. The selection was made on the basis of achievement in a chosen field and community service.

Jack A. McEnroe has been appointed assistant treasurer of the Central Hudson Gas & Electric Corp, and **L. Wallace Cross** has been made assistant manager of the Cost and Rate Division.

Wendell Parsons has been appointed travelling auditor for Iowa Southern Utilities Co.

Alvin Morris has been named manager of Central Power & Light Co's operations in Crystal City, Tex. **R. G. Whitney** has been made assistant plant chief at Nueces Bay Power Station.

William T. Nordeen has been dismissed as manager of the Douglas County PUD, as the commission said it needs a registered, professional engineer when it starts construction of Wells Dam on the Columbia River.

Herbert C. Purcell has accepted a position as assistant manager of the Golden Valley Electric Assn Inc, in California.

Howard L. Warshanek has been promoted to assistant secretary and assistant treasurer of Wisconsin Electric Power Co.

W. T. Smiley has been named national service manager for General Electric's mobile radio, communication products department; **John S. Harrington,** manager-decorative lamp sales, miniature lamp department; **Harland P. Sisk,** general manager, distribution transformer department; **Dr J. Herbert Hollomon,** general manager, general engineering laboratory; **Marc A. deFerranti,** to the international group; **David C. Miller,** manager-original equipment sales; **Donald D. Scarff,** general manager of the large lamp department; **James R. Olin,** manager of maufacturing, small AC motor and generator department; **John A. Adams,** manager of employee and union relations, insulating materials department; **Arthur W. Bartling,** manager of a component sales operation to serve manufacturers in the home, farm, commercial, and light industrial markets. GE has reassigned its Atomic Products Division to the newly-formed Electric Utility Group, headed up by Vice President **Clarence H. Linder.** The division was formerly part of the Electronic, Atomic and Defense Systems Group. The Atomic Products Division is headed up by General Manager **Lyman R. Fink. E. G. Dudley,** manager of the New York District, component and intermediate distribution sales department, has retired.

Ralph A. Larsen has been appointed chief design engineer of Stone & Webster Engineering Corp. He succeeds **Charles D. Lilburn,** who has been named design consultant.

I-T-E Circuit Breaker Co has named **Nye S. Spencer,** manager, utility marketing, and **William A. Donaldson Jr,** sales manager, switchboard section, Switchgear Division.

Babcock & Wilcox Co's Atomic Energy Division, has been reorganized into three new departments: A development department headed by **M. C. Edlund;** a contract department under **R. P. Grimes;** and **D. A. Plunkett** over the proposition department. **W. M. Breazeale** has been appointed senior technical advisor.

Robert W. Forster has been made manager of sales planning, room air conditioners, Airtemp Division, Chrysler Corp.

Line Material Industries has named **R. C. Greener,** and **A. V. Barnhill Jr** to the field engineering staff; Greener in New York, and Barnhill in Miami.

Carl A. Reeb has been appointed assistant to the president of Kerite Co. **Marshall C. Blevins** has been made Western manager, and **Dale E. Skyllingstad,** assistant Western manager.

Richard W. Little has been appointed manager of purchasing for the Supplier Division of International Business Machines Corp. **Arthur K. Watson** has been elected corporate vice president and group executive. Other appointments are: **C. Frank Greene,** purchasing manager for corporate procurement; **Joseph S. Rosenbloom** procurement manager, Oswego, N. Y.; and **Edward C. Smith,** procurement manager, Burlington, Vt.

Brown Co has made **Patrick J. Reilly** director of labor relations.

M. W. Kellogg Co has made **Kenneth H. MacWatt,** manager of sales, Fabricated Products Division.

Philco Corp has appointed **Joseph M. Hertzberg,** vice president-marketing of the Government & Industrial Group.

Columbus O'Donnell has been named president of Richardson-Allen Corp.

George J. Taylor, vice president of operations for Day-Brite Lighting, Inc, has been transferred to St. Louis as vice president in charge of research, development and marketing. **William Gundelfinger** has been made administrative assistant and director of manufacturing.

Kenneth Roberts has become manager of government engineering at Simplex Wire & Cable Co. **Everett Morss Jr** has become assistant to Vice President John T. Blake.

OBITUARY

James F. Tuohey, general sales manager of Arkansas Power & Light Co . . . **Myron E. Lukey,** 51, commercial manager of Commonwealth Edison Co . . . **Ivan C. Eppley,** 67, chief electrical engineer of Dayton Power & Light Co . . . **Frederick P. Fairchild,** 71, chief electrical engineer of Public Service Electric & Gas Co from 1937 to 1959 . . . **U. Sidney Shuman,** electrical project engineer of Philadelphia Electric Co.

NIAGARA

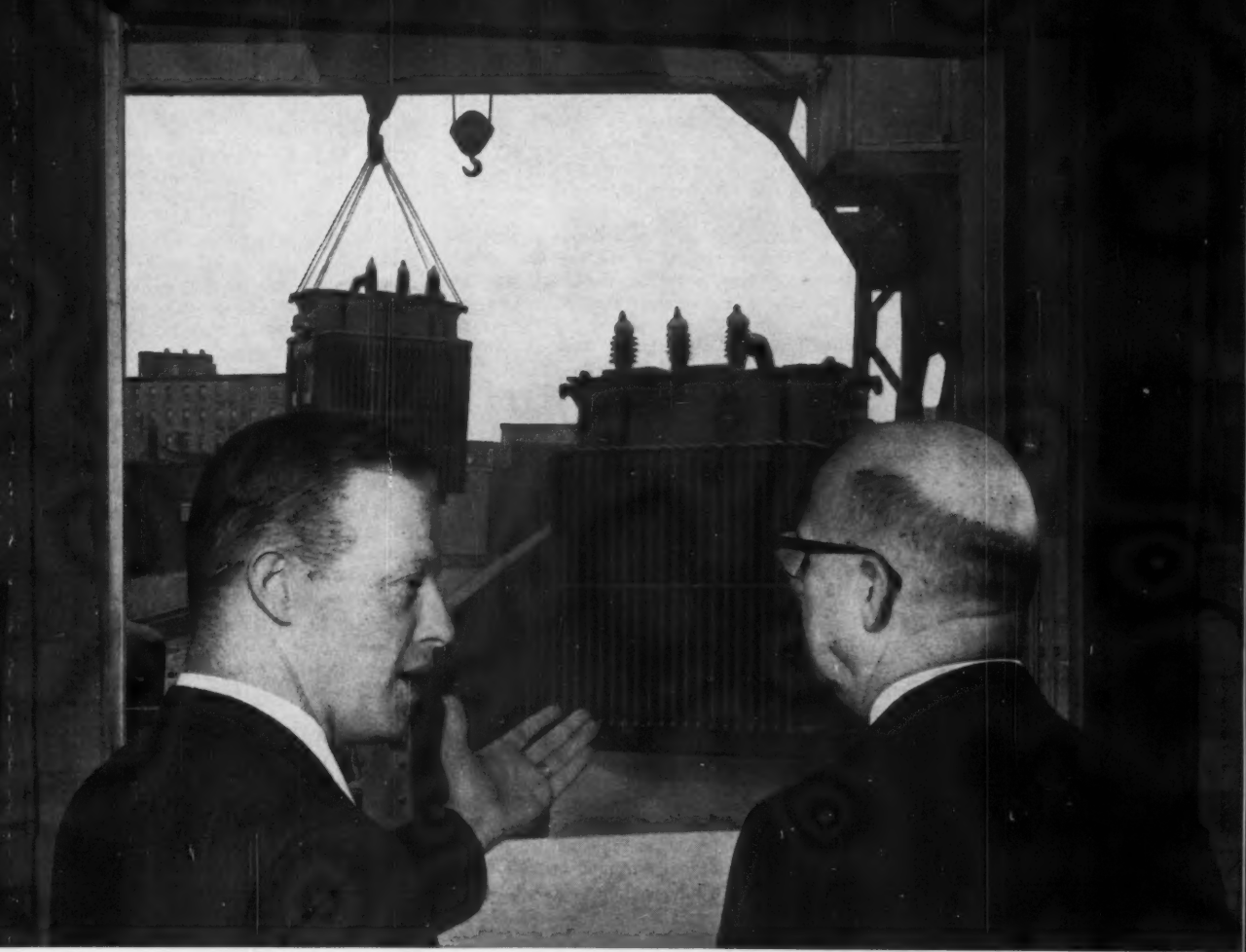
TRANSFORMERS

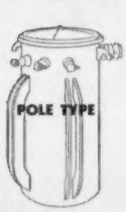
"You can count on Niagara. Really cooperative. They've never let us down."

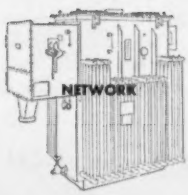
Sensitive to the needs of its customers, Niagara has proved its flexibility time and time again in scheduling urgent deliveries. Doing the "impossible" is not uncommon in this organization. Close, personal, *friendly* attention is uppermost. Even shipments are planned to minimize unloading costs.

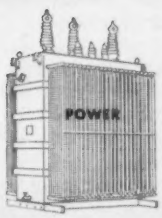
Built in accordance with established standards or to specified requirements, Niagara Transformers cover practically every service through 10,000 kva, 69,000 volts. Write for Bulletin 139. Niagara Transformer Corp., P.O. Box 23, Buffalo 25, N. Y. Representatives in principal cities.

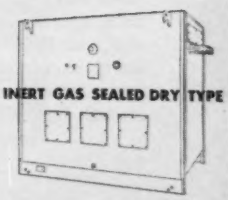
"There they are . . . we'll have power as scheduled."











Books

Servo Introduced

Introduction to the Design of Servomechanisms. By John L. Bower and Peter M. Schultheiss. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, N. Y. 510 pages, illustrated. Price $13.00.

This theoretical approach to the dynamics of linear feed-back systems is written for the engineering reader with no prior knowledge of servomechanisms. A familiarity with basic electrical circuits and some knowledge of differential equations is assumed. Some background material in the Fourier series and the LaPlace Transform is provided, as is a short appendix of servomechanism components.

This book should provide a good introduction to the subject for utility engineers concerned with steam station automation or other areas where servomechanisms are in use.

Hydro Scene Today Surveyed

Water Power Engineering. By Rolt Hammond. Published by Heywood & Co Ltd, London; distributed by MacMillan Co, 60 Fifth Ave, New York 11, N. Y. 293 pages, illustrated. Price $10.00.

As a general "review of recent progress in water power engineering," this descriptive work discusses the significance of water power, underground stations, turbine designs, the harnessing of tidal power and current high voltage problems. Descriptions of 28 recent and proposed projects in all parts of the world, including two for tidal power, enliven the text.

Guides Estimator

Electrical Estimator's Man-Hour Manual. By John S. Page and Jim G. Nation. Published by Gulf Publishing Company, Box 2608, Houston 1, Texas. 219 pages. Price $10.00.

This practical reference tool provides detailed direct man-hour estimates for almost 200 electrical installation jobs. Among the operations included: pole setting, stringing wire, distribution transformer installation, underground duct and cable work, excavation and concrete work, motor control installations, street and indoor lighting, communication and signal circuits, and conduit work. Labor estimates are based on a method of evaluating productivity efficiency, which the authors claim allows for wide variations in job conditions, weather, equipment, labor relations, and general business conditions.

This book should be of interest and value to utility construction supervisors and, to a lesser degree, power sales engineers.

Power Plant Explored for Tyros

Power Station Engineering and Economy —2nd Ed. By B. G. A. Skrotzki and William A. Vopat. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36, N. Y. 713 pages, illustrated. Price $12.50.

This is largely a descriptive text treating the entire driving end of power plants, published in its first edition as "Applied Energy Conversion." It covers steam, gas-turbine and hydro stations in some detail. Several interesting sections investigate other possibly exploitable power sources, such as tidal energy, solar heat and nuclear reactors. The final section discusses the basics of economics and relates them specifically to the power plant question.

Intended for junior and senior engineering students, this volume serves as an introduction to the mechanics of power plants. It assumes some knowledge of heat and mechanics.

Turbine Key to Plant Efficiency

Steam Turbine Performance and Economics. By Robert L. Bartlett. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36, N. Y. 308 pages, illustrated. Price $12.50.

"A combined text and reference on the calculation of steam-power-plant performance" is presented by Bartlett. On the concept that turbine heat-balance calculations are the first step to efficient plant operation, the heart of the work covers turbine performance, reheat, and feedwater heating calculations in detail.

An introductory section covers those "applications of thermodynamics which are of special value in considering the subject of turbine performance," but assumes a prior grounding in thermodynamics. Concluding chapters present essentials of economics, illustrated with examples from the basic subject matter. A generous chapter on gas turbines (by R. C. Sheldon) provides an extra. Supercritical plants are not discussed. The scope does not include the electrical end of the plant.

Books Recently Received

Electric Power Regulation in Latin America. By D. F. Cavers and J. R. Nelson. Published by the Johns Hopkins Press, Baltimore 18, Maryland. 282 pages, illustrated. Price $6.00.

Electromagnetic Fields, Energy, and Forces. By Fano, Chu & Adler. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, N. Y. 522 pages, illustrated. Price $12.00.

Electronic Computers Principles and Applications. By T. E. Ivall. Published by Philosophical Library, 15 E 40th St, New York 16, N. Y. 260 pages, illustrated. Price $15.00.

Motor Selection and Application. By Charles C. Libby. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36, N. Y. 486 pages, illustrated. Price $13.50.

Industrial Instrument Servicing Handbook. By Grady C. Carroll. Published by McGraw-Hill Book Company, 330 W 42nd St, New York 36, N. Y. 848 pages, illustrated. Price $16.00.

Electricity Undertakings of the World. Published by Benn Brothers Ltd., Bouverie House, 154 Fleet St, London. 647 pages, illustrated. Price $3.50.

Electrical and Electronic Drawing. By Charles J. Baer. Published by McGraw-Hill Book Company, 330 W 42nd St, New York 36, N. Y. 218 pages, illustrated. Price $6.00.

Cathodic Protection. By Lindsay M. Applegate. Published by McGraw-Hill Book Company, 330 W 42nd St, New York 36, N. Y. 229 pages, illustrated. Price $9.00.

Master Receiving-Picture Tube Substitution Guidebook. By H. A. Middleton. Published by John F. Rider Publisher, Inc, 116 W 14th St, New York 11, N. Y. 352 pages, illustrated. Price $7.45.

Economic Control of Interconnected Systems. By Leon K. Kirchmayer. Published by John Wiley & Sons, Inc, 440 4th Ave, New York 16, N. Y. 207 pages, illustrated. Price $12.50.

Bethlehem Tower Bolts last longer

. . . because they have 32 per cent more zinc than ordinary galvanized tower bolts.

Ordinary tower bolts, although they conform to ASTM Specification A-394 (minimum protective coating 1.00 oz per sq ft), retain an average coating of only 1.25 oz per sq ft. Bethlehem's special process for galvanizing tower bolts and nuts results in a much heavier coating—1.50 oz per sq ft minimum, 1.65 oz average.

The heavier zinc coating on Bethlehem bolts adds extra years of service. Let us tell you more about Bethlehem tower bolts and nuts. Contact your nearest Bethlehem office, or write us.

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Steel

for strength
. . . economy
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LETTERS

(*Continued from page 5*)

realize the maximum price/earnings ratio.

I think the effect of capital structure on price/earnings ratio is a very indirect one and is quite unlikely to be reduced to a formula, no matter how many computers are put to work on it. The principal factors affecting price/earnings ratio have varied with the times. In the earlier days of the industry, safety was the dominating influence—stocks of the large and stable companies commanded a high price/earnings ratio while those of the small companies could scarcely be sold at any price.

A couple of decades ago, the dividend yield was the most powerful factor. Much evidence was presented to commisions at that time to the effect that the dividend payout would determine the price of a stock.

In recent years, the prospects for earnings growth have become a dominating influence. Today Tampa Electric sells for 30 times earnings while a number of slow growing companies sell for half that figure.

My answer to obtaining the highest price/earnings ratio would be: select those policies, including many beyond capital structure, which would give the highest earnings per share and the best possibilities for future growth of these earnings. The fact that this might result in a low dividend payout would not seem, in the present market, to be a disadvantage.

Hugh Pastoriza
Coffin & Burr, Inc
70 Pine Street
New York 5, N. Y.

Engineers Joint Council To Publish a Newspaper

A quarterly newspaper called *Engineer* is being published by Engineers Joint Council.

The paper is being financed by allocation from membership dues, and circulates to the 300,000 members.

"The greatly increasing role of the engineer in national affairs, and the rapid-fire pace of technical developments demand a means of communication among all engineers—regardless of specialty," EJC President Augustus B. Kinzel said in announcing the new publication.

First issue was datelined "Spring, 1960," and the second issue will be published in June.

PROFESSIONAL SERVICES

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Consulting Engineers
Electricity—Water—Sewage—Industry
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(Classified Advertising)
EMPLOYMENT: BUSINESS: "OPPORTUNITIES" :EQUIPMENT :USED OR RESALE

DISPLAYED RATE:
EMPLOYMENT OPPORTUNITIES: $25.50 per inch, effectively Jan., 1960. Subject to Agency Commission.
EQUIPMENT & BUSINESS OPPORTUNITIES: $16.85 per inch for all advertising appearing on other than a contract basis. Not subject to Agency Commission.
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EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

—RATES—

UNDISPLAYED RATE:
$1.80 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.
PROPOSALS, $1.80 a line an insertion.
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DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

Send New Advertisements to Classified Advertising Div. of Electrical World, P. O. Box 12, N. Y. 36, N. Y.

TRANSFORMERS
1—6667 kva Westinghouse, 3/60/115,000Y/13750
1—6000 kva G.E. 3/66000/2400/4160Y
1—2000 kva Nia. Askrael, 3/13800/14160Y/2400
3—1000 kva Westinghouse, 1/22900/480
3—1000 kva Westinghouse, 1/13800/480
3—1000 kva Westinghouse, 1/13800/2400/4160Y
3—1000 kva Standard, 1/44000/6900
3—1000 kva Standard, 1/69000/4160Y/2400
3—1000 kva Standard, 1/34400/480
3— 833 kva Allis Chalmers 1/60/12,000—480
3— 200 kva Westinghouse, 4800—240x480
3— 100 kva G.E., 2400/4160Y—120x240
3— 75 kva G.E., 2400/4160Y—120x240
ERIE ELECTRIC CO., INC.
26 Mechanic St. Buffalo 2, N. Y.

FOR SALE
Substation Transformers
2—General Electric Unit Substation transformers, 1500 KVA Type OA/TU (1725 KVA—Type OA/FA), three phase, 60 cycle, 34,400 volt delta to 2520 volt delta. Form DM. Serial Nos. B359478 and B359479. Equipped with fans and relays to increase ratings to 1725 KVA. Four 2½% rated KVA taps at 36,200, 35,300, 33,500 and 32,600 volts with manual, no-load tap changer. Like new condition and appearance. Available immediately. Write, wire or phone
Village of Arcade, New York
Municipal Electric Department
Luke F. Sharon, Superintendent

BUY • METERS • SELL
Atlantic Electric Meter Corp.
415 Lexington Ave., New York 17, N. Y.

For results - - - use the SEARCHLIGHT SECTION

SYNCHRONOUS MOTORS WANTED

One (1) 1750 to 2000 HP double or single-ended shaft, 720 RPM unity power factor snychronous motor, arranged for operation on 13,800 Volt, 3 Phrase, 60 Cycle AC service, complete with one (1) set of magnetic reduced voltage starting equipment with accessories and with an interrupting capacity of 150,000 to 250,000 KVA.

One (1) 2500-3000 HP double ended shaft, 720 RPM unity power factor synchronous motor arranged for operation on 13,800 Volt, 3 Phrase, 60 Cycle AC service, complete with one (1) set of magnetic reduced voltage starting equipment with accessories and with an interrupting capacity of 250,000 to 350,000 KVA.

WRITE Harvey Aluminum, Attn: Don Sherbon, 19200 S. Western Avenue, Torrance, California.

FOR INFORMATION

About Classified Advertising

Contact The McGraw-Hill Office Nearest You.

ATLANTA, 3
1301 Rhodes-Haverty Bldg. *JAckson 3-6951*
R. POWELL

BOSTON, 16
350 Park Square *HUbbard 2-7160*
M. J. HOSMER

CHICAGO, 11
520 No. Michigan Ave *MOhawk 4-5800*
W. J. HIGGENS

CLEVELAND, 13
1164 Illuminating Bldg. *SUperior 1-7000*
W. B. SULLIVAN

DALLAS, 2
1712 Commerce St.,
Vaughan Bldg. *RIverside 7-5117*
GORDON JONES - F. E. HOLLAND

DENVER, 2
1700 Broadway, Tower Bldg. *ALpine 5-2981*
J. PATTEN

DETROIT, 26
856 Penobscot Bldg. *WOodward 2-1793*

LOS ANGELES, 17
1125 W. 6 St. *HUntley 2-5450*
W. C. GRIES

NEW YORK, 36
500 Fifth Ave. *OXford 5-5959*
H. T. BUCHANAN - R. P. LAWLESS
T. W. BENDER

PHILADELPHIA, 3
Six Penn Center Plaza *LOcust 8-4330*
H. W. BOZARTH H. NICHOLSON

PITTSBURGH, 22
1111 Oliver Bldg. *EXpress 1-1314*
P. PIERCE

ST. LOUIS, 8
3615 Olive St. *JEfferson 5-4867*

SAN FRANCISCO, 4
68 Post St. *DOuglas 2-4600*
S. HUBBARD

POWER PIPING SALES

Major Texas pipe fabricator and erector offers excellent opportunity for aggressive sales representative having established contacts with Consulting Engineering firms and Electric Utility companies. Should live in New York or Chicago area, though not necessary. Important that he be energetic, experienced producer in Power Piping field.

Salary commensurate with experience and ability. Submit complete resume and salary desired.

P-3989, Electrical World
520 N. Michigan Ave., Chicago 11, Ill.

ELECTRICAL ENGINEERS

Permanent positions in St. Louis office for recent graduates and experienced electrical engineers, or others with qualifying experience on design of electrical systems. Experience should include power plants, industrial power systems and related controls. Working knowledge of schematic and wiring diagrams essential. Important fringe benefits. Submit resume.

SVERDRUP & PARCEL ENGINEERING CO.
915 OLIVE STREET, ST. LOUIS 1, MO.

ARE YOU SATISFIED? WITH YOUR JOB—BUT NOT WITH YOUR FUTURE?

Then read further: Have you a background of electrical operations and line construction? Do you think you can sell? Are you willing to travel? A small progressive manufacturer whose products are leaders in their field used by power and telephone companies has an opening in the East AND MIDDLE WEST for an industrious and aggressive sales engineer. Salary, expenses and incentive bonus. Also many company benefits. If this interests you write for details.

P-3987, Electrical World
68 Post St., San Francisco 4, Calif.

San Francisco

Power and Industrial Division offers immediate employment opportunities for electrical, mechanical, or structural engineers capable of assuming responsibility on design of major steam or hydro power plants.

Relocation allowances cover moving costs plus transportation reimbursement for you and members of your family. If you have an interest in a San Francisco assignment, please send a resume of experience to George I. Copeland, Manager of Personnel. Personal interviews will be arranged for qualified candidates.

Bechtel

Corporation
220 Montgomery Street
SAN FRANCISCO

In New York City, a personal interview can be arranged by phoning Paul Keating, MUrray Hill 7-7100.

ADDRESS BOX NO. REPLIES TO: Box No.
Classified Adv. Div. of this publication.
Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITIONS VACANT

Wanted—Electrical Engineers. Minimum five years experience in public Utility Distribution. Transmission. Metering and Relaying. Required for permanent, responsible positions in Venezuela. Spanish an asset but not essential. Good living conditions. Starting salary of $13,000 per annum. P-3537, Electrical World.

Engineer, EE or ME—New Product Design. Established manufacturer of electrical connectors and distribution line hardware for the power utility trade. Experience either in the design, manufacture or application of related products desirable. Modern plant located in suburb of large midwest city. Salary open. P-3995, Electrical World.

Power Accountant—Middle East location— Maintain accounting comparable FPC system for generation, transmission, and books for distribution including operating, customer, and capital records—Supervise, train local personnel—10 years accounting with substantial electric utility experience—Salary $16,000 to $18,000 with two-year contract and other benefits. P-4016, Electrical World.

Supt. of Elec. Dist.—Municipal System with 11,500 meters. Elec. Engr. Degree, 2-5 yrs. exp. req'd. Vac., sickleave, ret'm't & hosp. ins. Send complete resume and salary req'm't to: Mr. D. B. Petty, Dir. of Util., City of Kinston, Kinston, N. C.

Electrical Engineers—A few openings for engineers with 5 years experience in design and construction of transmission and distribution systems normally associated with large utilities. Single men preferred but will accept married men with small families. Duration, minimum of 18 months. Salaries $12,000 and up. U. S. citizenship required. Location Middle East. Send detailed resume to Miner and Miner International, Inc., 5598 South Broadway, Littleton, Colorado.

SELLING OPPORTUNITY AVAILABLE

Representative wanted for manufacturer of street lighting equipment pole line specialties. Full particulars. RW-9821, Electrical World.

POSITION WANTED

Competent Manager. Engineering design and construction, standards, cost control. Market studies, utility rate structure and negotiations. Industrial, government R & D Utility generation and systems. Resourceful and technically sound EE. Ten years outstanding record one employer. Age 40, $18,000. PW-4096, Electrical World.

Don't forget

the box number when answering advertisements. It's the only way we can identify the advertiser to whom you are writing.

Utilities Saved by Joint Planning, EEI Told

An estimated joint saving of $7 million in fixed charges was obtained through the coordinated planning of new generation added since 1955 to the Illinois-Missouri Power Pool, the Edison Electric Institute's Electrical Systems and Equipment Committee was told recently at Philadelphia, Pa.

Factors that made joint planning advantageous, said H. G. Gores, Illinois Power Co, were these:

1. Abundant low-cost coal in southern Illinois.

2. Increasing size of generating units in the pool.

3. Need for extra-high-voltage transmission within the pool and heavier external inconnection.

4. Power displacement through interconnections as a result of normal and emergency operations of other systems.

Simplicity Stressed

By stressing simplicity, high reliability at minimum cost was achieved in the electrical design of Eddystone Station of Philadelphia Electric Co, said Frank W. A. Myers. High efficiency of the plant's two 325-Mw supercritical-pressure turbine generators demanded a maximum availability factor and electrical reliability, he told the committee.

Design features were:

1. The unit system for main and auxiliary station equipment.

2. A simple 4-kw radial system for supplying auxiliaries.

3. Double cooling of main transformers.

4. Welded aluminium construction for the 132-kv substation support structures to minimize maintenance.

5. Railroad right-of-way for 132-kv transmission.

6. Two completely independent protective systems for each protection area for generators, transformers, buses, and lines with back-up relay speed equal to or approaching that of the primary relaying.

Moisture accumulating in the desiccant jars after a year or two of service constituted the chief difficulty experienced by Union Electric Co on 22 installations of 138 and 34.5-kv vacuum switches for line, capacitor, and transformer switching, said R. W. Katterhenry and D. E. Shain. It was overcome, they said, by redesigning the gasketing.

Oil Handling Topic

Oil handling at Philadelphia Electric Co is keyed to the use of a company-owned tank fleet and mobile equipment for filtering and reclaiming, said E. L. Schlottere. Centralized oil reclamation, he said, was rejected initially because of congested traffic conditions, but a central plant for servicing the suburban area will be considered if oil-handling expansion is necessary.

Measures Insulation

J.E. Mulavey described a method of measuring insulation resistance of energized generator field circuits developed by Detroit Edison Co. It uses a 5,000-ohm potentiometer connected across the slip rings to balance the voltage to ground, so that line insulation resistance may be measured directly. The device permits measuring insulation resistance with field conductors subjected to normal rotational forces. It has detected several low readings.

R. R. Wagstaff, United Engineers & Constructors, reporting activities of the EEI-AEIC-NEMA joint committee on switchgear, said that reclosing ratings of circuit breakers, long considered too severe, are about to be revised. New de-rating factors are pending approval as standard by ASA. Rate of rise of recovery voltages has been studied as a bases for new ratings of compressed air breakers. He noted some discussion on shortening the 4 sec basis for current rating of breakers, as a way to reduce breaker costs. The move met resistance from those who said that less than 4 sec-current rating would jeopardize backup protection on systems.

Advertising Index

Air Preheater Corp. 47
Allen-Bradley Co. 119, 120
Allegemeine Elektricitats-Gesellschaft 113
Allis-Chalmers Mfg. Co. 13, 15
American Chain & Cable Co., Inc. Wright Hoist Div. 114
American Pamcor, Inc. 26
Automatic Switch Co. 133

Bethlehem Steel Co. 139
Blackburn Corp., Jasper 109
Bussmann Mfg. Div. McGraw-Edison Co. 102, 103

Chance Co., A. B. 39, 40, 41, 42

Diamond Alkali Co. 14
Directory of Engineers 140

Eastern Gas & Fuel Associates 101
Ebasco Services, Inc. 50
Engineers, Directory of 140
Enjay Co., Inc. 105

Federal Pacific Electric Co. 34
Fischer & Porter Co. 12
Ford Motor Co. 116, 117
Foxboro Co. 35

General Cable Corp. 130, 131
General Electric Co.
Apparatus Dept. ..... 2nd Cover, 18, 30, 31, 36, 37, 88, 89, 90, 91, 94, 95, 134, 135
Large Lamp Dept. 56
Silicone Products Dept. 43
Graybar Electric Co., Inc. 7
Grinnell Co. 6
G&W Electric Specialty Co. 115

Harper Co., H. M. 111
Hoosier Engineering Co. 100

I-T-E Circuit Breaker Co. BullDog Electric Products Div. 57
Indiana Steel & Wire Co., Inc. 112

Kearney Corp., James R. 10, 11
Kuhlman Electric Co. 58, 59
Kyova Fiber Pipe Co. 98, 99

Lapp Insulator Co., Inc. 45
Line Material Industries 23, 24, 25

Mallory & Co., Inc., P. R. 60
McCabe-Powers Body Co. 4
Minneapolis-Honeywell 129
Moloney Electric Co. 17

Niagara Transformer Corp. 137

Ohio Brass Co. 51, 52, 53, 54

Peabody Coal Co. 32
Pennsylvania Transformer Div. McGraw-Edison Co. 126
Phelps Dodge Copper Products Co. 110
Pioneer Service & Engineering Co. 108

Radio Corp. of America 61
Reynolds Metals Co. 97
Rome Cable Div. of Alcoa 38

Sangamo Electric Co. 16, 62
Searchlight Section 141
Simplex Wire & Cable Co. ..... 3rd Cover
Square D Co. 33
Standard Oil Co. (Indiana) 27
Stone & Webster Engineering Corp. 125

Utility Tool & Body Co. 114
Uptegraff Mfg. Co., R. E. 55

Wagner Electric Corp. 44
Weaver Co., J. A. 46
Westinghouse Electric Corp. 8, 9, 48, 49
Westinghouse Electric Corp. Lamp Div. 106, 107
Wheeler Mfg. Co., Griscom-Russell Co. 28, 29
Worthington Corp. ..... 4th Cover
Wright Hoist Div. American Chain & Cable Co., Inc. 114

PROFESSIONAL SERVICES 140

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 141

EQUIPMENT (Used or Surplus New) For Sale 141

Ocean-bed Bonanza!

Seven miles off the coast of Louisiana, Freeport Sulphur Company is preparing to tap a rich, new sulphur deposit — under 50 feet of water!

The base of mining operations, pictured above while under construction, consists of a Y-shaped island stretching for nearly one mile and towering more than 60 feet above the water.

Five large and ten smaller steel pile towers, connected by 200-foot-long bridge spans, support the complex facilities whereby sulphur is melted in its underwater formation by superheated water, and then brought to the surface in molten form.

The vital power for this operation pours from huge generators to the drilling platforms through Simplex submarine power cables. Simplex, a working partner of the mining industry for thirty years, is proud to participate in this monumental engineering achievement.

Simplex

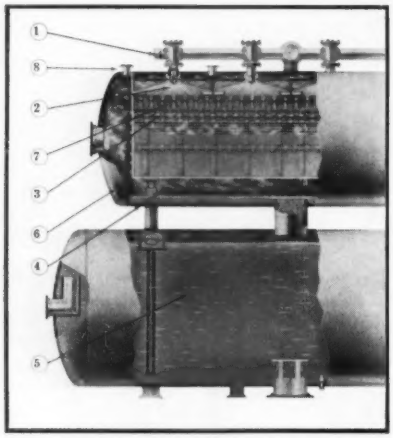
LIVE BETTER ELECTRICALLY

WIRE & CABLE COMPANY

79 Sidney Street, Cambridge 39, Mass.

Suppose you had to find...

ONE PART IN A BILLION



The true counter current principle used in Worthington tray deaerators: (1) water enters; (2) water is atomized into primary heating chamber; (3) water flows over staggered rows of heating and deaerating trays; (4) water finally falls freely through pure steam to (5) storage; (6) steam enters at bottom only; (7) steam sweeps all non-condensable gases upward; (8) mixture vents through suitable baffles.

One grain of sand in this sand box is about one part in a billion. (6 cu. ft. of 40 mesh sand). Imagine throwing in a few grains of salt and finding them again. Impossible? Well, Worthington deaerators do comparable work.

To protect the fluid handling equipment in modern multi-million dollar steam generating plants Worthington tray deaerators do a similar task. They "sift" through the water to leave as little as *two . . . three . . . four* and frequently no more than *five* parts oxygen in one billion parts effluent as the deaerator operates from less than 10% to over 100% rated load. (An equivalent job is done by Worthington spray-type designs.)

Why do Worthington tray deaerators perform so well? First, they're among the few built with the more efficient counter-flow design. Second, by passing inlet water through spring-loaded spray valves, ideal atomization and distribution are guaranteed over the entire load range.

But another basic reason is Worthington engineers who concentrate on deaerators. Working alongside of men designing pumps, condensers, ejectors—all the major components of the fluid handling group—these specialists have unparalleled experience in "system-matching". Very important, too, are our research facilities in which deaerators are continually on test.

In fact, Worthington has 105 years of experience that bears on fluid handling problems in both conventional and nuclear power plants. To draw on this experience —or just to talk deaerators—contact your nearest Worthington district office. Or write to Worthington Corporation, Section 45-17, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantford, Ontario.

WORTHINGTON